INTELLIGENT VEHICLE-HIGHWAY SYSTEMS (IVHS)

(103–66)

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
INVESTIGATIONS AND OVERSIGHT

OF THE

COMMITTEE ON
PUBLIC WORKS AND TRANSPORTATION
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

SECOND SESSION

JUNE 29 AND JULY 21, 1994

Printed for the use of the
Committee on Public Works and Transportation

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CONTENTS

JUNE 29, 1994

TESTIMONY

PREPARED STATEMENTS SUBMITTED BY MEMBERS OF CONGRESS

PREPARED STATEMENTS SUBMITTED BY WITNESSES

SUBMISSIONS FOR THE RECORD

ADDITION TO THE RECORD

JULY 21, 1994

PREPARED STATEMENT SUBMITTED BY A MEMBER OF CONGRESS

PREPARED STATEMENTS SUBMITTED BY WITNESSES

SUBMISSIONS FOR THE RECORD

[1] Retained in subcommittee files.

ADDITIONS TO THE RECORD

INTELLIGENT VEHICLE-HIGHWAY SYSTEMS (IVHS)

WEDNESDAY, JUNE 29, 1994

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to call, at 9:38 a.m., in room 2167, Rayburn House Office Building, Hon. Robert A. Borski (chairman of the subcommittee) presiding.

Mr. BORSKI. The subcommittee will come to order.

The subcommittee today will be examining the application of advanced computer technologies to our Nation's transportation system. These systems are commonly known as Intelligent Vehicle Highway Systems, or IVHS, but there is a much broader use of advanced technologies to all forms of transportation that makes the title "intelligent transportation system" more appropriate.

These advanced technologies have the potential to dramatically change the way our transportation system works. They can help transit systems work more efficiently and better for the riders, providing more information on routes, and allowing buses to use the fastest routes. They can help motorists avoid the delays and congestion that too often accompany driving. They can speed the flow of traffic on highways and through tollbooths.

These advanced technologies must be a major part of our Nation's transportation program in the future because of their great potential to allow better, more efficient use of the existing infrastructure.

The use of advanced technology will allow faster movement of passengers and goods on the existing infrastructure, which is a great improvement on the current alternatives of expanding our transportation infrastructure, which is often costly and can face community opposition and a never-ending maze of environmental hurdles or restricting growth.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) was the first major recognition in legislation on the need for a national effort on advanced transportation technologies. Now, almost three years later, it is time for this subcommittee to review the progress that has been made in an area where events are moving quickly because of the rapid changes in technology.

We want to evaluate how the Department of Transportation (DOT) has been implementing this program, what regional, State and local efforts have been undertaken, and how these develop-

ments have affected different segments of the transportation community.

We are especially interested in determining what plans are being developed for deployment and maintenance of intelligent transportation systems in the Nation's major metropolitan areas. These areas with the worst congestion and air pollution problems must be able to use the latest technology.

These advanced intelligent transportation systems may offer the best chance for developing a balanced and effective modern transportation system in metropolitan areas. By making transit more attractive to potential riders, advanced technologies can make transit systems more viable and highways less congested.

Through traffic management systems, the traffic on metropolitan roads and highways will be able to move more freely, avoiding the numerous slowdowns that can frequently lead to major traffic jams today.

Intelligent transportation systems are the link between the transportation system of the mid-20th century and the transportation system of the future. The potential of intelligent transportation systems is huge and we should be taking full advantage of them.

Now, I would like to recognize distinguished Ranking Member, the gentleman from Oklahoma, Mr. Inhofe.

Mr. INHOFE. Thank you, Mr. Chairman.

The focus of today's hearing has always been of great interest to me as a pilot. I have used the GPS technology for quite sometime. A couple years ago I flew a small aircraft around the world and it is incredible to think that all the way across Siberia and all the way around the world, we knew within 15 meters where I was at all times.

In fact, we have a trucker in Oklahoma that has had this quite sometime on his trucking operation. He can monitor where his trucks are at all times. In fact, if a truck should pull into a bar or something, he would know exactly where it is and it has been a very effective tool for him.

I realize that the IVHS technology involves a lot more than just navigation. It is being used to improve traffic control and increase efficiency in toll collection facilities and increase vehicle safety.

In Oklahoma, my home State, the turnpike authority has been a leader in the use of electronic toll and traffic management systems. I think Oklahoma was the first State to have it installed on all of its toll roads. Currently on 550 miles of toll roads, 35 percent of the users on the toll roads in Oklahoma use this technology. It is something that clearly is coming into the system and we have used it successfully there.

So, Mr. Chairman, I look forward to these meetings and this hearing and thank you for having it. I think we also have someone else who has an opening statement, Mr. Gilchrest.

Mr. BORSKI. The gentleman from Maryland, Mr. Gilchrest is recognized.

Mr. GILCHREST. Thank you, Mr. Chairman.

I would like to thank you for scheduling this hearing this morning on the subject of intelligent vehicle-highway systems. I do have to say that one of the joys of traveling for me, at any rate, is to

always not being sure where I am, so I am not sure if I will put this in future vehicles, and in asking where you are. But anyway, that is—my home State of Maryland is a leader in this area with the chart system used to advise motorists on upcoming traffic conditions and hazards.

I would also like to welcome one of our witnesses today, Mr. Steve Reich, who is Executive Secretary of the Maryland Transportation Authority and a member of the I–95 Corridor Coalition.

I don't need to emphasize to anyone on the committee the importance of the 95 corridor to the entire Northeast. The States which contain that corridor have joined together to try to maximize the efficiency of that thoroughfare. The I–95 Coalition has embraced and advocated the IVHS concept, and I am glad Steve is here to represent us today.

I am afraid that I have a markup, Mr. Chairman, in another committee. We always seem to schedule these things this way, but after the markup, I will try to make it back to the hearing. And I do think this is an important concept. Whether I use it or not, I think it is a very good concept.

Thank you.

Mr. BORSKI. The Chair thanks the gentleman.

We would like to welcome our first witness this morning. Mr. Lawrence D. Dahms, Chair, IVHS AMERICA, and Executive Director of the Oakland California Metropolitan Transportation Commission. Mr. Dahms is accompanied by Mr. James Costantino, Executive Director, IVHS AMERICA.

Would you please stand and raise your right hands and be sworn in.

[Witnesses sworn.]

TESTIMONY OF LAWRENCE D. DAHMS, CHAIR, IVHS AMERICA, AND EXECUTIVE DIRECTOR OF THE OAKLAND METROPOLITAN TRANSPORTATION COMMISSION, ACCOMPANIED BY DR. JAMES COSTANTINO, EXECUTIVE DIRECTOR, IVHS AMERICA

Mr. BORSKI. You may proceed. As I understand it, we are going to start today's proceedings with a short five-minute video presentation?

Mr. DAHMS. Yes, sir.

[Video presentation.]

Mr. BORSKI. That is a very intelligent film. I understand it goes for some greater length, for any people who may be interested in viewing it.

Mr. Dahms.

Mr. DAHMS. Jim is going to start.

Mr. BORSKI. Start with you, Dr. Costantino, if you wish.

Let me say, if I may, we have a busy agenda here today and a competing one on the Floor of the House. We expect to be interrupted here on several occasions for Floor action, so I would ask all our witnesses to make a five-minute oral presentation, if that is possible, and of course remind everyone that their entire statements are made part of the record.

Dr. Costantino.

Dr. COSTANTINO. Mr. Chairman and Members of the subcommittee, I am James Costantino, Executive Director, IVHS AMERICA.

We are a nonprofit educational and scientific association which began operations in early 1991 to coordinate and accelerate the development and deployment of Intelligent Transportation Systems in the United States.

IVHS AMERICA is designated as a utilized Federal Advisory Committee to the U.S. Department of Transportation. We have more than 500 organizational members from the private sector, government agencies at the Federal, State and local levels, major universities and research institutions, related associations and public interest groups who serve with us.

I am here today accompanying the Chairman of our Board, Mr. Lawrence Dahms, who is Executive Director of the Metropolitan Transportation Commission for the San Francisco Bay area. Every day he is on the front lines in the battle for an improved transportation system where more than 150 separate entities share authority over the vast street, freeway, bus, train, cable car and ferry network.

I am pleased to inform you that about half of the IVHS AMERICA membership is comprised of public sector organizations like Mr. Dahms's organization. We include 31 States among our members, and several Metropolitan Planning Organizations.

IVHS AMERICA is so concerned with public involvement in Intelligent Transportation System development and deployment that we recently began forming regional chapters across the country to more directly involve the cities, towns, counties, MPOs and other local government agencies in our programs.

Larry Dahms well knows how Intelligent Transportation Systems can improve travel conditions in metropolitan areas and how IVHS AMERICA can help bring about these improvements. You recently had several questions for IVHS AMERICA. Mr. Dahms, Chairman of our Board, will present an oral statement and has provided a statement for the record that we believe will be fully responsive to these questions.

Thank you, Mr. Chairman.

Mr. DAHMS. Mr. Chairman, I am Larry Dahms, the Chairman of the IVHS AMERICA Board of Directors. And on behalf of IVHS AMERICA, would like to thank you for this opportunity to discuss our efforts in the IVHS program and my written testimony does dwell at length on the questions that you have asked.

The mission of IVHS AMERICA is to accelerate the development and deployment of advanced technology for our Nation's surface transportation system. IVHS AMERICA's role in the program is to bring interested parties to the table to coordinate their efforts and to build consensus. We provide this information to the U.S. Department of Transportation as noted.

Our goal is also to encourage our members to foster public-private partnerships for IVHS development at all levels. One of the most successful public-private partnerships is the I–95 Corridor Coalition referred to already. I understand they are testifying today and we have utmost respect for their work.

An early effort by IVHS AMERICA with the DOT was development of the first IVHS Strategic Plan in May 1992. We are working with DOT now on the National IVHS Program Plan and development of an open system architecture. To build consensus as these

plans are developed, we seek public comment through outreach forums, regional meetings and Federal Register notices. The National Program Plan is scheduled to be completed this December and will be revised annually. Phase One of the architecture program entails definition by four consortia selected by DOT and ends this December as well. The consortia with the most promising architecture will continue into Phase Two. Refinement of the architecture in this second phase extends through July 1996.

These planning efforts contribute more effectively to deployment as they are coordinated with the field operations tests. TRAVINFO is an operations test managed by my organization, the Metropolitan Transportation Commission, and designed to assist travelers in the San Francisco Bay area.

The TRAVINFO information center will assemble information data from a variety of sources to make it available to the general public, public agencies and commercial vendors. The design contract has been awarded and the evaluation plan finalized. A management board meets regularly.

Launched in 1993, TRAVINFO's demonstration phase continues through 1996 to provide an early test of just how well several public and private sector entrepreneurs can merge their interests to the benefit of the traveling public.

This is a real-life example of how advanced travel or information systems work. We learn from the experiences of these field operations tests and through the work of our many volunteer technical committees, in this case, the ATIS Committee, Advanced Traveler Information Systems Committee.

Dr. Joel Markowitz from my staff at the Metropolitan Transportation Commission is one of these volunteers. He chairs the ATIS committee and has been active as well as a member of the Advanced Public Transit Systems Committee, referred to as APTS. This committee is concerned with applying advanced technologies to high-occupancy, shared-ride vehicles, including conventional buses, rail vehicles, and the entire range of paratransit vehicles.

Currently, the focus is on three areas: vehicle location, communications, and smart cards. The Ann Arbor Smart Bus Project tests all three. An on-board system monitors performance in regard to route location, speed and status of mechanical systems and enables buses to communicate with a central control system, facilitating bus fleet supervision and providing for real-time information to serve the public. The smart card fare system serves both as a bus and station parking pass.

IVHS fund sources will have to expand and be directed to public transit to replicate the Ann Arbor experience elsewhere. The financial stimulus must be matched also by a willingness on the part of transit managers to take some risks in adapting the technology if we are to realize its full benefits.

The IVHS AMERICA Outreach and Education Program targets State and local transit officials for this very reason. We are pleased to note that the first standard adopted specifically for an IVHS application applies to data communication networks for use in transit vehicles. Acceptance of the standard by the Society of Automotive Engineers was based on the cooperative efforts of the APTS Committee and the Federal Transit Administration.

The Commercial Vehicle Operations Program shows real promise as well. A key goal of this program is creation of transparent State and international borders. That will be achieved in part by automating collection of information required by government agencies.

As many States seek funds to modernize information processing systems, they also seek better systems. IVHS AMERICA is taking the lead to develop standards to achieve a nationwide interoperable system for electronic clearance and the handling of administrative data associated with crossing borders.

In the area of electronic toll collection, IVHS AMERICA is finishing a document that will define performance-oriented technical requirements for electronic toll and traffic management systems. In this effort, IVHS AMERICA circulated the draft documents to a broad audience and incorporated their comments. In its final form, the document will be used for standards identification and setting by the appropriate organizations.

International interest in IVHS is growing as well. We are a coordinating organization with Europe, Japan, Canada and Australia for the First Annual World Congress and Trade Show on Intelligent Transport Systems. It will be held in Paris this November. Vice President Gore has been invited to lead the U.S. delegation which will feature Secretary Peña and other transportation officials. Over 3,000 people are expected to attend.

A comparative study of international activities by IVHS AMERICA at the request of Congress found the U.S. program leads those of Japan and Europe in areas of organization, strategic planning and current levels of research and development. The U.S. leads also in certain applications, such as electronic toll collection and commercial fleet management, but we are behind in deployment.

Our competitive strength lies in Federal policy support and in the coordination of public and private sector interests. Sustaining financing for deployment and continuing operations will be critical to maintaining a competitive advantage.

Increasing interest in defense conversion was demonstrated by the exhibits at our trade show in April in Atlanta. Of the more than 120 exhibitors, over half were defense and aerospace contractors striving to apply their technology to the surface transportation system.

IVHS is a concept whose time has come. While much of the technology is available, we must work on institutional barriers. Highway agencies, for example, will have to develop expertise in a variety of new disciplines. Government procurement practices, which often make joint efforts difficult, may have to be reexamined in light of IVHS. Success will also depend on how IVHS is seen in the larger context of environmental, social and economic objectives.

To advance IVHS deployment, it must be funded. The ISTEA's $659 million over a six-year period applies primarily to research and development and operational testing but not to deployment. Uniform national and international standards must be developed. This is to ensure compatibility among IVHS systems and services.

Finally, more support and involvement of local government officials is needed.

In conclusion, the costs of traffic congestion and traffic accidents are huge. IVHS technologies were intended to help relieve conges-

tion, increase safety, improve productivity, energy efficiency and environmental quality. With your continued support and our public-private partnership efforts, we will have a significant impact.

Thank you again for this opportunity to review our progress. Jim and I will be pleased to respond to any questions.

Mr. BORSKI. Thank you very much, sir, and welcome again.

Again, Dr. Costantino, feel free to answer if you wish. I will address them to Mr. Dahms, if you will.

What role do the Metropolitan Planning Organizations play in the IVHS program? Are they being consulted on funding and planning decisions by DOT and the States?

Mr. DAHMS. Jim has worked me hard as a recruiter for my peers in the world of MPOs. My organization is a Metropolitan Planning Organization, so the effort is clearly being made and there are a number of places around the country where leadership is being taken by the Metropolitan Planning Organizations.

I think most importantly, as we look towards deployment, the fact that we have a strong role in allocating some of the flexible funds that ISTEA provides will be very important. In our case, as an example, this may seem pedestrian in the overall context of IVHS, but just the idea of synchronizing signals among my 100 cities can become a challenge. But with flexible funding, we were able to prompt some improvements in that regard by funding more of that work. As a number of our hundred cities are relatively small and don't even have the staffing that they need, we were able to use this kind of funding to retain engineers to support them.

It is not just the field operation tests and grants that DOT makes available to us. It is not just the early deployment grants that they make available to us, but it is also the ISTEA flexible funding. That is, all of which can reinforce making advances in this area.

Mr. BORSKI. I guess again, the way it would work best is if the MPO is totally engaged. Is that happening. Are they engaged in some areas better than others?

Mr. DAHMS. I think you answer your own question. Yes, in some areas better than others. I think the opportunity is there, but it is challenging. The TRAVINFO project that I referred to that we manage is stretching our ability, I will admit that.

If we are required to contract with a traffic engineer to assist a city with their synchronized signals, that is one thing, but in TRAVINFO, we are contracting with a defense firm who does business in ways that we are not familiar with, and so that is a challenge for us. I think it is worth the risk. It helps us help our community, I think, move—take advantage of the technology sooner, but it does require being willing to step out and do some things that we haven't been doing before.

Mr. BORSKI. GAO's testimony states that in fiscal year 1992 and 1993 DOT spent 9 percent of its IVHS funds on transit applications. Are these adequate resources to meet transit—the transit industry, needs and is the transit community doing its part to support the application of IVHS technology to transit?

Mr. DAHMS. I think probably the answer relative to the transit industry is similar to the one relative to the Metropolitan Planning Organizations. Some are willing to step forward and others aren't.

I referred to the Ann Arbor experience and I also referred to the fact that a transit manager does have to be willing to take some risk. But Mike Bolton, who was the manager in Ann Arbor, just got promoted to Austin, so I guess for him taking the risk has already paid off personally.

Bob MacLennen from Houston sits on the IVHS AMERICA Board and his organization has been very active in taking advantage of this technology. In my own area, the Bay Area Rapid Transit District has been active in advancing the use of technology.

So I think it is scattered, but there are some success stories.

Mr. BORSKI. Mr. Dahms, the IBTTA and the IAG will testify later today about their concerns that existing ETTM systems may not meet national standards for ETTM when those standards are eventually set.

In your testimony, you refer to the performance-oriented ETTM technology requirements that IVHS AMERICA is preparing to give to a standard-making body. Will these requirements allow existing ETTM systems to continue to be used?

Mr. DAHMS. I think this may be a question that Jim can answer better than I.

Dr. COSTANTINO. At the present time, Mr. Chairman, the second draft of the ETTM requirements, which has been put together by the users of ETTM, not the vendors or not the producers of the various systems, has gone out and we are now receiving comments from the ETTM community.

The package will not make a firm recommendation on a specific piece of equipment, or on any specific frequency, but will allow as much flexibility as possible, and they will be performance specifications. They are not geared to any one particular State or any one particular vendor's equipment. So there is a broad area of flexibility.

They are still in the process of working on them, and hopefully there will be something that comes out of it, which is based on performance that many or most manufacturers will be able to meet, and will be compatible with existing systems such as the one that is already installed in Oklahoma which I have toured and thought was a wonderful system.

Mr. BORSKI. Let me follow that, Dr. Costantino. Is DOT moving quickly enough to develop a system architecture and set standards, for example, for electric toll collection?

Dr. COSTANTINO. At the present time, much of that activity is taking place through a standards and protocols committee of IVHS AMERICA that represents and has on its committee structure all of the interested parties. So there is a great deal of debate and consideration that is going on in that area. It is not a simple question to answer. Many people have to be heard from. Many organizations have to be heard from. The Department of Transportation, Federal Highway Administration and others are participants in that discussion.

Mr. BORSKI. Mr. Dahms, there will be testimony later this morning suggesting that an important goal for the IVHS program should be equitable access to mobility for all. Could you discuss how IVHS programs contribute to this goal?

Mr. DAHMS. Well, let me dwell on our project in the Bay Area again, TRAVINFO. TRAVINFO will gather data on the status of the highway system and on the status of the transit system and process it in order to provide real-time information for both trip planning and for adjustments as part of the trip.

I think particularly as it relates to the transit program, having better information is going to be a very important asset, because one of the things that transit use suffers from is people not having a good feeling about where the bus is going and what time it is going to be there and so forth. Sort of a fear of asking a dumb question gets in the way of using the service, you might say.

So I believe that is one example of how using this advanced technology in order to provide better information in various formats should provide the general public better access to the system.

I think it is fair to say that there will be facets of this program that are going to develop in the marketplace and the marketplace is not always totally equitable from—against everyone's standards. But nonetheless, I think to the extent which the public investment is spent, there should be a lot of opportunity to make sure that the results and benefits are equitably distributed.

Mr. BORSKI. One concern I have is that we will develop all this technology and then no one will be able to afford to deploy it or to operate and maintain it after it is deployed.

Who will pay the cost of deploying IVHS technology after it is developed and who will pay the cost of operating and maintaining the system after it is deployed, especially in urban areas where there are so many priorities for limited funds?

Mr. DAHMS. Well, maybe that is the $64 thousand question. I don't think there is any question but what that is going to be one of the more difficult things that we have to face up to. I think that our experience to date suggests we haven't faced up to it well enough.

We have just gone through in my region an update of our regional transportation plan according to the ISTEA rules which essentially say it is a 20-year budget. That was a pretty sobering experience. In doing that, we discovered that we are not—essentially are not adequately maintaining our local streets and roads. So we pay more attention to building things than we do to maintaining things, and I think that experience will translate—could translate to these kinds of technologies.

On the other hand, these technologies are being advanced in recognition of the fact that in most urban areas we are limited in our ability to expand capacity by building more lanes or even building large transit systems. Therefore, it seems to me that if we can, in effect, capture in some fashion what we would have spent, what we might have invested in expansion of facilities, and redirect those kinds of investments into not just the installation of this kind of technology, but also the operations and maintenance of it, then the prospect for not digging a hole for ourselves has promise.

Mr. BORSKI. Okay, thank you, sir.

Let me yield at this point to the gentleman from Oklahoma.

Mr. INHOFE. Thank you, Mr. Chairman.

Mr. Dahms, as you were talking I was thinking a little bit about some legislation we have had in the last few years on the telephone

monitoring and how this had certain efficiencies that came into play. Then all of a sudden there is this surge of concern over privacy issues.

Do you see privacy as being something that will surface in this area?

Mr. DAHMS. Well, it certainly is one of the concerns and I think Jim, again, may be better able to answer that than I. I do understand, from what limited information I have about your own experience in Oklahoma, that is something that has been successfully dealt with in the toll facilities you have there, that privacy was seen to be a concern and has been successfully dealt with. But maybe Jim could add to that.

Dr. COSTANTINO. Again, Mr. Chairman, and Mr. Inhofe, there is a Committee, a Legal Issues Committee, which is working on that very issue, in addition to other institutional-type and jurisdictional-type problems within the IVHS community. They have developed a series of draft pronouncements with regard to privacy. And generally speaking, we are in the transportation business and not in the legal business of enforcing regulations and so forth.

So our first interest is in transportation, and these issues essentially say the bottom line of the policy statements, draft statements, that we are primarily interested in the movement of traffic and products and people and so forth, and that we are not interested primarily in their regulation.

However, there are ways of using information to facilitate the movement of traffic, and the line between what is regulating and enforcing and the efficiency of the traffic is a very gray one. But we are working in that area and we hope to come up with some guidelines, working with the people who are actually the users and with the vendors to make certain that we come up with something which is sort of a consensus in the community.

Mr. INHOFE. I was just thinking the example that I used in my opening statement, that they are able to more accurately determine where vehicles are, and this also might be determining other forms of behavior and I think that that might be surfacing. And even though it is not something you are dealing with as a transportation issue, it is still out there and it could affect you as time goes by.

Just one other question that probably would be better asked of the next witness, Mr. Hill, but perhaps you have an opinion on this. It seems like when you have new technology coming on and all these things that sound so good—and I am very much impressed with this because I use this type of technology—that it should at some point result in some kind of efficiencies. Unfortunately, once you have an efficiency, the government agencies do shrink rather they continue on and on and on.

Do you think in the long run that this is going to result in a savings of government expenditures, or do you think that somehow new bureaucracies will have to be formed and this is just going to increase the cost of public expenditures in the long run?

Mr. COSTANTINO. My own personal observation, from what I am familiar with and that we are doing and some of the places that I have visited where we are using this advanced technology, the idea is to make it far more efficient to operate and more efficient in the movement of goods and services than it presently is. We are

not trying to build a big bureaucratic infrastructure. I don't think that would result from applying technology to surface transportation.

Mr. INHOFE. I am reminded of a quote by former President Reagan. "There is nothing closer to immortality on the face of this earth than a government agency when it is formed."

So I always look at this and think that there are people out there waiting, good, it will take more regulation, then they will have Commerce fighting for it and Transportation fighting for it, but I am certainly hoping that this will result in efficiencies, as well as safety and other things that were goals that we have.

Mr. DAHMS. If I could add to that, I think there is the potential for very large efficiencies in terms of the user of the system. Just a small example. In our region in the last year or so, we have contracted with a tow truck company to roam the freeway system on a regular basis in the commute hours, the purpose being to clear up incidents quickly. So when there is an incident on our freeway now, within seven minutes one of our tow trucks clears that incident. Given that a very substantial part of congestion is related to incidents and given the domino effect of incidents, this is a way to clearly make that system more efficient.

Now, that is just something we do with tow trucks, but as we have this better information and as the film related to the situation in the Santa Monica quarter demonstration project, as other devices assist us in clearing these incidents, I think that is going to result in tremendous efficiencies.

Now, as relates to the government agency that does the work, I think to some extent, the agencies are going to have to transform to these new tasks. In our case, it was one of contracting with some tow truck operators instead of doing something else that we might have been doing.

So I think we are going to have to shift to the operational mode, and away to some extent, at least in the urban areas, from the building mode.

Mr. INHOFE. I think in Oklahoma's experience in the electronic tollbooths, it has resulted in efficiencies, and in order to enforce the efficiencies, they had to institute a hiring freeze, because in government, you don't fire people for inefficiency, it just doesn't work, but through attrition.

Efficiencies are definitely on their way in Oklahoma. And you can see this too because, as I said, 35 percent of the users now are using this in Oklahoma and a lot of those are from other States, so it seems to be very successful, at least there.

Thank you very much.

Mr. BORSKI. Mr. Dahms, we held hearings earlier this year on transportation safety. Are there any IVHS technologies that are specifically directed towards truck safety?

Mr. DAHMS. Jim reminds me that the film that referred to the Greyhound Bus collision avoidance systems is probably the best immediate example of part of a safety program.

Mr. BORSKI. Is that technology being used by bus companies or by truck companies?

Mr. DAHMS. The Greyhound Bus Company is using it now, but it is a technology that would be transferable.

Mr. BORSKI. You mention in your testimony that internationally the United States IVHS program leads in several important measures, but that Japan remains ahead in the development of advanced traffic management systems and advanced information systems. Are there lessons we can learn from Japan's success in regards to deployment of ATMS and ATIS?

Dr. COSTANTINO. That is correct. In a study that we just completed, Mr. Chairman, we came to that conclusion and find that Japan, for example, is one innovation away from making the link between these traffic management centers and the Advanced Traveler Information Systems that are within vehicles and signs over highways. A communications link would set up a rather elaborate system in Japan where drivers would be given up to data information on a real time basis.

I think that the Japanese got a very early start in technology. They have been working in this area for 20–25 years, and they have traffic management systems in about 161 of their major metropolitan areas that are operating. They are moving now from a phase one, the initial phase that they installed, to a second phase of these traffic management systems. Where in most cases in this country, we don't even have a handful of them and we are still struggling to try to get our first phase in.

So I think that the Japanese and to a great extent the Europeans recognized early on that technology which existed, not something that had to be developed, but technology that existed should be applied to surface transportation. We have done that in many of our transportation modes especially aviation. At any given moment in this country, we only have maybe five thousand commercial carriers flying around and the pilots of those aircraft are under complete control. They know everything, when they are arriving, when they are landing, what the weather is and so forth.

We have in this country almost 180 million motor vehicles, and the drivers are ignorant of traffic when they get in their vehicles. So I think that if there is anything we have learned it is if the technology is there, we certainly should use it.

Mr. BORSKI. Mr. Dahms, one of our later witnesses uses the San Francisco Bay area as an example of where the multiplicity of Federal, State and local agencies can act as an institutional obstacle to the timely development of a nationwide compatible IVHS infrastructure. Since you come from that area, I would like to get your reaction.

How do the 100 cities, nine county governments, over a dozen congestion management and sales tax authorities, 24 transit operators in the Bay Area affect the deployment and operation of the technology in the Bay Area?

Mr. DAHMS. Well, that witness has got the numbers right. I would offer first that that is probably the most important role that my organization plays is the coordinating of efforts with the hundred cities and nine counties and Cal-Trans and the California Highway Patrol.

Our experience prior to ISTEA was one of partnering to accomplish whatever we hoped to accomplish. With ISTEA, we decided that was a stimulus to move to another threshold of effectiveness as partners. One month after the President signed the bill, we cre-

ated what we call the Bay Area partnership, which is more than 30 Federal, State, regional, local agencies that meets bimonthly, has three working committees, and sponsors what we call the jump-start program. The freeway service patrol tow truck contracts that I just referred to is one of those jump-start projects.

The intention was to focus on multiple agency projects and then put the spotlight on them so that they didn't get lost between the chairs, and clearly the kind of technology that comes from IVHS to be applied will require that these partnerships work well together. But we are building on our ability to work effectively as partners.

The TRAVINFO project that I referred to is a joint project of Cal-Trans, our State Department of Transportation, and my organization, the Metropolitan Planning Organization. It also includes a lot of assistance from the private sector. The freeway service patrol is a partnership of Cal-Trans, the California Highway Patrol and my organization.

There are a number of projects where we join together and essentially call upon the strength of the individual agencies. The strength of my agency often is that our procurement process actually works faster than the State's procurement process, so often they like to work through us just so we can move things quickly. But in any case, we look for the strength in any of our partnership endeavors, and who has what strengths in putting things together.

Cal-Trans has the largest current IVHS application in its traffic operations system, which is similar to the one that was referred to in Los Angeles, and it is just currently being developed. So the surveillance equipment and the coils in the roads and the ramp metering and the science and all of that that comes with the traffic operation systems is a Cal-Trans project, but its implementation requires working with every one of these communities along the way. So we have established task forces along the way in order to facilitate the integration of that system with the local systems. It is not all working perfectly, but we are working hard at it.

Mr. BORSKI. IVHS is a program where advances are taking place at a rapid rate. It is critical that an effective process be in place to disseminate the information on benefits and successes of technologies in order to stimulate demand for additional applications. GAO in its testimony today will say that DOT has not developed a comprehensive means of sharing information developed through its research and operational tests.

What information sharing capabilities does DOT have and how does IVHS AMERICA supplement DOT's efforts, and do you agree that DOT needs to do more to publicize its research and test results?

Mr. DAHMS. Well, I don't think anyone can ever argue that you shouldn't do more. But on the other hand, it seems to me an awful lot is being done. The last meeting of the Board of Directors of IVHS AMERICA was an enlightening one. We were advised by our own staff of all the outreach that is taking place. There is a substantial amount of outreach taking place. But are we reaching all of the potential clients and users? I think the answer is probably no. I think that that is just something that you have to keep working.

Ultimately, though, I do believe there is a responsibility borne by all of us who are the local officials that people are trying to reach out to. It is one of those things where you can lead a horse to water but you can't make it drink.

IVHS AMERICA and Federal Highway Administration have been active in my area, the Bay Area. We assisted them in establishing a workshop to invite in our local officials. We made a major effort to get people there, to introduce them to the work of IVHS. I think we had maybe 100 local officials that attended. That is not enough. But I think the effort is being made. More effort is probably required. I think there will always be an answer. It is not quite enough.

Mr. BORSKI. A key part of an incident management system is highway advisory radio. I understand that these radio stations only have a power of 10 watts and that their range is only about three miles. How useful can they be to drivers if they have such a short range?

Dr. COSTANTINO. We could supply that for the record, but we are not working in that level of detail, Mr. Chairman.

Mr. BORSKI. Any further questions?

Mr. INHOFE. No.

Mr. BORSKI. I have one last question, if I may. Does the current use of the term "intelligent vehicle-highway systems" results in too narrow a focus for the application of this technology? Would renaming the program "intelligent transportation systems" help to overcome some of the skepticism that some groups have about IVHS and perhaps better reflect the goals of the program to reduce congestion, enhance safety and improve quality?

Mr. DAHMS. That is a question that has been posed to IVHS with increasing frequency of late, and it—the board of directors meets next at the end of July and that is an item that is going to be on its agenda. Hopefully we will resolve that.

Mr. BORSKI. There being no further questions, we want to thank you very much for your testimony and the very exciting, outstanding work you are doing.

Mr. DAHMS. Thank you, Mr. Chairman.

Mr. BORSKI. Our second witness is Mr. Barry T. Hill, Associate Director of Transportation Issues at the General Accounting Office (GAO).

Gentlemen, can I ask you to raise your right hands.

[Witnesses sworn.]

Mr. BORSKI. Thank you very much.

Mr. Hill.

TESTIMONY OF BARRY T. HILL, ASSOCIATE DIRECTOR, TRANSPORTATION ISSUES, RESOURCES, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY JOSEPH CHRISTOFF CHICAGO FIELD OFFICE AND MATTHEW BYER SEATTLE FIELD OFFICE

Mr. HILL. Thank you, Mr. Chairman.

Before I begin, allow me to introduce my colleagues. With me today on my left is Joe Christoff from our Chicago field office, and to my right is Matt Byer from our Seattle field office, both of whom

are responsible for work in the surface transportation infrastructure area.

I will quickly summarize my prepared statement in accordance with your wishes.

We certainly appreciate the opportunity to testify on the Department of Transportation's Intelligent Vehicle-Highway System program. My testimony today will focus on three areas: first, where the IVHS funds have been spent to date; second, the progress that has been made in implementing these technologies; and third, issues that may affect the attainment of IVHS goals.

Let me start by discussing where the IVHS funds have been spent to date. Through fiscal year 1993, DOT obligated nearly $275 million on IVHS projects. Nearly 60 percent of these funds, or $159 million, has been used for operational tests. These primarily are tests of so-called smart technologies, such as in vehicle navigation systems and electronic toll collection systems.

DOT obligated another $60 million, or 22 percent, on research and development. About a third of this, or $20 million, is supporting projects to develop an automated highway system where vehicles will interact with the highway and each other to operate with minimal driver assistance.

Finally, about 10 percent, or $28 million has gone toward efforts that will in some way lay the groundwork for IVHS deployment. For example, about a third of these funds have been spent on developing a system architecture or a framework that will define how various IVHS technologies will work together to optimize their benefits.

Let me now quickly turn to my second issue, progress that has been made in implementing IVHS technologies.

IVHS technologies are in various stages of maturity. Some are available and being used today, while others will require additional research, development and testing before they are ready to be deployed. For example, some travel and traffic management technologies are already being used to provide drivers and local transportation officials with real-time information on traffic conditions, thereby improving traffic flows and minimizing congestions.

Electronic toll collection has been deployed in five States and is already planned for many other locations. In contrast, other travel and traffic management system technologies, such as in vehicle navigation systems, have not been widely deployed, in part because of limited consumer demand to date.

Commercial vehicle and public transit technologies are receiving widespread acceptance and use in many States. For example, automatic vehicle identification and weigh-in-motion technologies are increasingly being used to facilitate the safe and efficient passage of trucks over State lines and to gather information to assist states in tax collection.

In contrast, advanced technologies and, more specifically, the automated highway system, is still for the most part in the developmental phase and we are likely decades away from realizing the full potential of these technologies.

Finally, I would like to briefly discuss a number of key issues that we believe may affect the future attainment of IVHS goals. The first of these is the high cost and market uncertainty of devel-

oping and deploying IVHS technologies. The deployment of a nationwide IVHS transportation network will require substantial investments by the public sector, private industry and consumers.

For example, IVHS AMERICA estimates that about $6 billion will be needed through the year 2011 to complete research and development and operational tests. More significantly, over $200 billion will be needed for deployment. The public sector's share of these costs is expected to amount to more than $40 billion with the balance of the costs being borne by consumers and the private sector.

Given current budgetary pressures, the magnitude of these costs casts a great deal of uncertainty over the public and private sector's willingness and ability to invest in these technologies. Similar uncertainties exist for consumers who may not be willing to pay for expensive technologies, such as on board route guidance systems which may cost well over a thousand dollars.

Second, there is the issue of a system architecture and standards that must be developed to coordinate and integrate the many IVHS technologies. This architecture is critical because it serves as a framework within which the various parts of the IVHS system will work. It is also needed to ensure compatibility among different technologies which directly impacts on their marketability.

DOT is in the process of developing an IVHS architecture which is scheduled to be completed by mid-1996. We believe that the timely completion of this effort is critical.

The third issue relates to DOT's management of the IVHS program and, more specifically, to its responsibility to serve as an information disseminator for the program. To date, DOT has not put in operation an effective mechanism for sharing information on the results of its many projects.

Because the ultimate deployment of IVHS technologies is heavily dependent on consumer and private sector investment, it is critical that information about the availability and benefits of IVHS technologies be made available to these users.

Despite this need, until recently, DOT has placed little emphasis on information dissemination. To partially meet this need, in February 1994, DOT established a joint IVHS program office to manage and oversee the program and to insure that the program results are available to interested parties, including private industry and State and local governments.

We believe that the establishment of this office is a positive step toward providing a central focus for the program and that the JPO has the potential for serving a valuable role in disseminating program results to the IVHS community.

Mr. Chairman, this concludes my statement, and we would be happy to respond to any questions that you may have.

Mr. BORSKI. Thank you very much, Mr. Hill.

Given your analysis of DOT's funding for fiscal year 1992 and 1993 IVHS projects, are DOT's funding priorities sensible? Are they investing their limited resources in areas of greatest payoff in terms of reducing congestion and improving safety and protecting the environment?

Mr. HILL. Overall, I have to say that we think that DOT has achieved a pretty proper balance in the way the IVHS program has

been funded so far. They have basically spent about 22 percent of IVHS funds on basic R&D to develop the technologies, and about two-thirds of the funding is being directed towards operational tests. In the technology development program such as this, that is probably a pretty fair balance in terms of the actual funding itself.

Within that funding itself, they seem to have covered just about all the key areas in terms of travel and traffic management emphasis, commercial vehicles, transit, safety related technologies. It seems that on the whole the funding priorities have been rather sensible.

Mr. BORSKI. You note in your testimony the goal of the IVHS program is to develop a test track for the automated highway system by 1997. Do you think this goal distorts the direction of IVHS research in a way that would not occur if research decisions were based solely on the expected payoffs of different kinds of research?

Mr. HILL. There are critics out there who have raised concerns about the goal of developing this automated highway system test track within the time frame that is being talked about here. These critics do point out, or at least say, that funds could be spent better elsewhere. We have not, to our knowledge, and everyone we have spoken to, really been able to identify specifically what projects are not being funded at this time.

If you look at the funding expenditure itself, I believe they will have funded about $30 million through this fiscal year for the automated highway system and they are asking for another $20 million for fiscal year 1995. The act specifies this as a goal, and I must say that DOT is taking the goal very seriously and they really are attempting to get the test track in place.

Whether there is too much funding going into this area, it is really hard to say, and the reason I say that is that a lot of the technologies that are being developed for the automated highway system do have applicability to other parts of the programs in terms of crash avoidance systems, or breaking systems. So it is not like the money that is being funneled toward developing the automated highway system is strictly being dedicated to this so-called jettison highway of the future. The technology will be applicable to other technologies that will be deployed prior to that.

Mr. BORSKI. A concern I have is that we will develop all this technology and then no one will be able to afford to deploy it or to operate and maintain it after it is deployed.

Who will pay the cost of deploying IVHS technology after it is developed? Who will pay the cost of operating and maintaining the system after it is deployed, and, again, particularly in urban areas where there are so many other priorities for such limited money that may be available?

Mr. HILL. That is an excellent question, Mr. Chairman. I think Mr. Dahms referred to this as the $64 million question. I would refer to it as the $200 billion question.

Mr. BORSKI. Inflation.

Mr. HILL. That to us is the key issue of this program, and the way I view this program is the Federal Government has made a commitment to help develop the technologies, to demonstrate their feasibility, and to basically put the framework and architecture in place for deploying this program.

The ultimate cost of deployment, though, will be borne by the State and local and private concerns—the users of the technology basically. The costs will be great. The total costs we give are for a nationwide network. There are parts of this program in terms of deployment that could be done incrementally.

Mr. Dahms, Mr. Costantino mentioned traffic control signals, advanced traffic management systems. These are incremental steps that State and local governments can take to meet particular transportation problems and concerns that they are having within their area, but there is no question that the deployment costs are going to be high.

The operational and maintenance costs for advanced traffic management systems are going to be difficult, anywhere between $640 million to $1.8 billion yearly. Certainly the localities are going to have to absorb those costs and also balance the need for that with other local priorities and problems that they are dealing with.

Mr. BORSKI. Would this be an unfunded mandate in your view to the localities?

Mr. HILL. I don't think it is an unfunded mandate because really none of this is required. I think what we have here is a program that is developing technology to assist and aid States and localities in dealing with problems they are having in their transportation system, and because of that, there is really nothing that they are required to do. But with the congestion problems and the traffic problems that they are having, it is important that these technologies be deployed in a way that they are usable, they are affordable, they make sense, and they will help solve local problems.

Mr. BORSKI. I yield to the gentleman from Oklahoma.

Mr. INHOFE. You asked the question I was going to ask about unfunded mandates. As a former mayor, that was going through my mind during your testimony and the previous testimony.

You mention the success of the European and Japanese in some of these areas of technology. I am reminded a little bit of the late 1980s when this subcommittee and the aviation subcommittee and other public works and transportation subcommittees were all concerned with technology in the airport security. They had they had the TNA system that supposedly the French were so far ahead of us, only to find out they really weren't.

Are we lagging behind in reality, and if so, why would this be?

Mr. HILL. I think you have to look at the historical progression of this program. In the 1960s, I think it was known that the United States was basically providing leadership in the basic research and technology area for IVHS types of technologies.

During the period of the 1970s and for most of the 1980s, however, the U.S. program basically laid dormant. It did not receive a lot of emphasis from the Federal level. Whatever progress that was made during that period was primarily made by the private sector itself.

Certainly in the last three or four years, the program has received renewed emphasis, a substantial increase in funding. Basically this program in the United States has been reborn, and they have come a long way, I think, in the last three or four years and have made significant progress in some key areas.

If you look at the European and the Japanese program, particularly Japanese program, they have been making investments in IVHS technology and deploying the technologies for the past 20 years. They have had steady funding. They have put great emphasis on installing advanced traffic management systems, and their program is taking off.

They have also made an investment in the deployment of this from the public sector standpoint as well, so I think that has helped to increase consumer acceptance of the technologies.

Mr. INHOFE. When you talk about an investment, you are talking about public investment that they have been——

Mr. HILL. Yes, help—assisting to get that infrastructure in place, that is right.

Mr. INHOFE. In your forecasts on costs, are you taking into consideration the fact that the elements of these various technological systems become so cheap so rapidly?

I am just thinking about the GPS system. It is now about 20 percent of the cost of what it was four years ago, and this is one of the few areas where costs actually go down as technology improves.

So I would ask, do they experience that in some of the older systems, more mature systems in Europe, and are you anticipating that here?

Mr. CHRISTOFF. I think a good example is, at least within Japan, on-board navigational systems. When the public began to accept them, the infrastructure was in place. The costs did go down from around $6,000 per car to about $2,000 per car.

So, true, if you can break into the market and the public begins to accept some of these technologies, certainly the costs are going to go down.

Mr. INHOFE. Yes, I would think so too.

Thank you very much.

Mr. BORSKI. Mr. Hill, the establishment of the system architecture and standards is critical to insuring compatibility among IVHS technologies and services. Is DOT moving quickly enough in setting standards and setting up a system architecture?

Mr. HILL. They seem to be making progress on this. As Mr. Dahms' answered, one of the questions, you can always look at something and say we wish they would do it quicker and better. They are certainly making progress on this and the system architecture is developing.

There are two sides to this issue. There are some who feel that you can't develop a system architecture and standards too early because if you do, you will stifle the research and technology development elements of the program; that you must let the technology unfold to a point where it becomes rather clearer what the appropriate architecture and standards are.

On the other hand, you run the risk if you wait too late of putting this in place that there is a lot of technology that has been developed, a lot that has been deployed, and people then have to go back and reengineer things and reinvest in technologies to replace what they have.

I think they are at that critical crossroads right now, and we are encouraged that they are making the progress they are in the architecture. I believe their plan right now is to have the architecture

in place by mid-1996. Certainly that is a key date because I think over the next two years, there are a number of technologies that will reach the point where they are being deployed.

Mr. BORSKI. Now that DOT has established its IVHS joint project office, what are the principal challenges they will be taking on in GAO's view? What issues need to be addressed that have not been addressed adequately or at all to date?

Mr. HILL. The joint program office is basically going to provide something that this program hasn't had and really is critical. This is a very complex, very pervasive program involving lots and lots of groups, both at the Federal and the State and local and the private sector.

The joint program office is going to provide a central focus for which all the program information and the oversight and management of the program will be consolidated in one point or one office within the Department of Transportation.

This will be a key role. If they can effectively fulfill this role, this would be a very, very beneficial thing for this program to have right now.

This office also has a potential of really serving as that information disseminator that we referred to in our statement. That point at which information from the bottom up is coming, from the program, results of the technology is being drawn together, and basically the point at which this information can be sent out to the stakeholders in terms of how these technologies are working, what are the benefits, what are the costs, what are the risks involved in purchasing any of these technologies.

Mr. BORSKI. Is DOT spending too much time on developing plans and writing reports and not concentrating enough on project development?

Mr. HILL. That is a tough question. Here again, I have got to go back to where this program has come in the last few years. As recently as 1990 this program was only receiving about $4 million of funding. This year this program is expected to obligate about $310 million.

It has just been a dramatic increase in the size and the funding and the emphasis of this program, and I would kind of like to think it is a six-year effort and they are in the third year of the effort. I kind of like to think that DOT has just emerged from the phase of this program where they are basically setting the program up, they have come out with a strategic plan that has laid out the mission and vision and goals and objectives of this program, and they are working toward getting some concrete plans.

They are coming up with a program plan later this year that hopefully will specify more of what is needed in this program in terms of future direction and hopefully a little bit more on the deployment aspect. So I think a lot of what you have seen in terms of reports and studies have basically been focused at kind of setting this program up, getting it in motion, getting a lot of people stimulated and involved in this effort, and it has really been quite an undertaking on their part.

Mr. BORSKI. Mr. Hill, IVHS is a program where advances are taking place at a rapid rate. It is critical that an effective process be in place to provide information on the benefits and successes of

technologies in order to stimulate demand for additional IVHS applications.

In your testimony, you say that DOT has not developed a comprehensive means of sharing information developed through its research and operational tests. What information sharing capabilities does DOT have and does IVHS AMERICA supplement DOT's efforts?

Mr. HILL. Right now IVHS AMERICA has played a key role in assisting DOT in this effort in terms of disseminating this type of information, and I guess what we are interested in seeing is a more systematic way of getting the information organized, analyzed and out to the ultimate users.

Hopefully the JPO, the Joint Program Office, will help serve this role. The reason it is important is since a large percentage of these deployment costs have to be borne by the State and locals and the private sector, and since this is not a mandated program but basically a program that is developing the technology and making it available, the ultimate success in terms of deploying these technologies will be getting that information out to the users, letting the users know just what technology is available to solve their local needs, how much it is going to cost, what the benefits are to them, what the risks are, and how they can take various pieces of technology, and piece them together to solve their local transportation problems and concerns.

So this is going to take a rather massive information disseminating effort, and up till now, they have been getting by, I think, with the assistance of IVHS AMERICA. Now that some of this technology is going to be coming out of the back end of this research, development testing pipeline, it will be more critical than ever that they get this information organized and analyzed and out to the users in a usable format.

Mr. BORSKI. Does the gentleman from Wisconsin, Mr. Barca, desire recognition?

The gentleman is recognized.

Mr. BARCA. Thank you very much, Mr. Chairman, and I appreciate the information that has been provided to us today through GAO through the testimony.

Are you planning on doing a formal report on this issue or issuing some sort of a full report?

Mr. HILL. No, we were not—we were not planning to issue a formal report, but quite frankly, I think this IVHS program is going to be around for a few years. I would imagine GAO will be involved in future audits of various aspects of the program.

Mr. BARCA. And very important to me, one of the issues I am very interested in is the coordination between the States and the Federal Government and between the States themselves, and I think you have touched on that before in your testimony.

I was getting caught up with some of the staff here. But one area in particular—maybe I will just ask about in a little more depth and I guess Mr. Inhofe had touched on this as well—deals with the privacy issue. I know that in the State of Wisconsin we have a State Privacy Council that has been looking into a whole broad array of issues concerning privacy, and you touched on that briefly

in your testimony here in terms of some of the concerns that have arisen.

But going back to that question of how you coordinate that with the States, has there been much work done in terms of looking at this from the standpoint of what work States have done in this respect, as well as from the Federal Government's standpoint and how we make sure that we do protect privacy needs of people at the same time as we take advantage and utilize this exciting new technology?

Mr. HILL. I do know that one of the projects that are being funded in this program is looking at the privacy issue. I do not know what results have come out of that project yet. I think it will be an issue that as time goes on, in the long term, will become a more significant issue.

As the technologies become more developed and sophisticated and we are able to identify the location of vehicles and different characteristics of vehicles, privacy issue concerns will probably be raised more significantly than the concerns are right now.

Mr. BARCA. That is not something, though, that your office in terms of any future work, or report, might do, that is not an area you would necessarily center on though at the GAO?

Mr. HILL. We had no plans on centering on that. Here again, I think it is an issue that DOT is studying right now. We would obviously be interested in seeing the results of that effort.

We would be interested in seeing whether this is the type of issue they are planning to address in their program plan that is coming out later this year and we would certainly follow this issue as the program unfolds and it becomes a concern or a problem; I am sure GAO would be involved in it at that point.

Mr. BARCA. Okay. Thank you very much.

Mr. BORSKI. Any further questions?

If not, we want to thank you very much for your testimony and I am sure we will be seeing GAO on this issue many times in the year to come.

Thank you, Mr. Hill.

Mr. BORSKI. On our third panel, we have Mr. Steve Reich, Executive Secretary of the Maryland Transportation Authority and Executive Board Member representing the I–95 Corridor Coalition; Mr. Matthew Edelman, General Manager, TRANSCOM; Mr. Mike Zimmerman, Chairman, Policy Committee, and Director of Administrative Services for the New York State Thruway, representing The Interagency Group; and Mr. Alan V. Johnson, Executive Director, Ohio Turnpike Commission, representing the International Bridge Tunnel and Turnpike Association. Mr. Johnson is accompanied by Mr. Neal D. Schuster, Executive Director, International Bridge Tunnel and Turnpike Association.

If we are all here, could I ask you to please rise, raise your right hand.

[Witnesses sworn.]

Mr. BORSKI. Thank you very kindly.

Mr. Reich.

TESTIMONY OF STEVE REICH, EXECUTIVE SECRETARY, MARYLAND TRANSPORTATION AUTHORITY, ON BEHALF OF THE I-95 CORRIDOR COALITION; MATTHEW EDELMAN, GENERAL MANAGER, TRANSCOM; MICHAEL ZIMMERMAN, DIRECTOR OF ADMINISTRATIVE SERVICES, NEW YORK STATE THRUWAY AUTHORITY, ON BEHALF OF THE E-ZPASS INTERAGENCY GROUP POLICY COMMITTEE; AND ALAN V. JOHNSON, EXECUTIVE DIRECTOR AND ASSISTANT SECRETARY TREASURER, OHIO TURNPIKE COMMISSION, ON BEHALF OF THE INTERNATIONAL BRIDGE, TUNNEL & TURNPIKE ASSOCIATION, ACCOMPANIED BY NEIL D. SCHUSTER, EXECUTIVE DIRECTOR, INTERNATIONAL BRIDGE, TUNNEL & TURNPIKE ASSOCIATION

Mr. REICH. Thank you, Mr. Chairman.

Good morning, Members of the subcommittee. I am Steve Reich, executive secretary of the Maryland Transportation Authority, the agency in my State which is responsible for the operation and maintenance of the toll facilities. But I am here today on behalf of the I–95 Corridor Coalition, which my agency and many others here are a member. I appreciate the opportunity to testify this morning on IVHS programs in general and particularly on behalf of the coalition.

The I–95 Corridor Coalition represents the largest and furthest development of the four national priority corridors that were identified in the ISTEA legislation. We have over 30 members, transportation providers, highway and transit, representing States from Virginia to Maine.

Before I begin, I would like to just take a minute to let you know the high level of coordination since that was the subject of some of the questioning here this morning.

The folks right here at this table, TRANSCOM, is one of the key members of the coalition and its general manager, Mr. Matt Edelman, is also the chair of our steering committee of the coalition. TRANSCOM is serving as the coalition's interim communications agency to disseminate information up and down the corridor.

Mr. Mike Zimmerman is representing John Shafer from the New York State Thruway, who is the vice chair of the coalition, as well as the executive director of TRANSCOM. And Mike is also representing E-ZPass, a group of people who are trying to coordinate electronic toll collection in our part of the country.

The coalition is delighted with the development of the E-ZPass program and believes that it will be a major benefit throughout the region. The coalition also belongs to IVHS AMERICA and they in turn sit on our steering committee, and me and my agency are members of the IBTTA, which are also represented here today.

So I guess what one organization learns is shared with each other and that means, at least in our part of the country, we really believe that the IVHS planning and the early deployment is coordinated and we think the Federal folks are getting at least the most bang for the buck in the Northeast.

As you undertake your review of the IVHS program, we would ask this subcommittee and the full committee for your strong support for the priority corridor program, including the I–95 Corridor

Coalition and our five-year program to implement the Nation's most comprehensive IVHS system.

In establishing the priority corridor system, Congress allocated over $42 million annually to be used in four designated areas. If the priority corridors are to make progress in implementing their programs, it is essential that this funding be consistently available over the life of the program. Otherwise, we will just have this piecemeal approach.

The justification for what the coalition is up to is submitted with my full testimony. It is something called our business plan, which outlines our discrete projects, and I won't get into a lot of detail here this morning given the time constraints, but we do have a well-thought-out plan and coordinated effort, we think, for the deployment of this technology in the Northeast.

We are requesting $12.5 million in fiscal 1995 but that represents only a small fraction of the 300 to 400 million that our member agencies are spending annually on IVHS in the Northeast.

We figure there is about 300 active projects up from Virginia to Maine and that full implementation of those projects would amount to about $1.2 billion. So in relation to the total IVHS program, the priority corridors in this 12.5 that the coalition seeks for fiscal 1995 is a small amount of money, but it really, in essence, provides the glue for all of these 30 agencies to maintain some sort of a coordinated effort in one of the most important corridors in the country.

Our program is multimodal and intermodal in its breadth and we deal with both the movement of passengers and freight in the Northeast. We are particularly concerned with transfer points, multi-transfer points at the ports, bus stations, critical regional places like Union Station here in Washington, National Airport, and that is the focus of much of our effort.

CVO, commercial vehicle operations, is another where we are working. There are several studies going on up and down the corridor, and, again, the coalition is acting as an information clearinghouse so that when the standards are developed, the information is quickly gotten out and we could all be at the table sharing what our individual respective agency's needs are.

You asked, I guess in the written questions, for us to comment on the coordination of the electronic toll collection issue. And you will hear directly from our E-ZPass group here in a second, but if I could just take a second, there are lots of member agencies in the coalition that sit on the interagency group, but there are lots of other agencies who are independently developing our own electronic toll collection systems.

While there is a need for a national standard, some of these systems, a cost-benefit analysis would show you that in two to three years, they have paid for themselves. And I would urge everyone involved in this to allow those systems to proceed, and, yes, when a national standard is developed, that the systems be thought of as personal computers and throwaway technology and that we will fall in line with the national standard. Obviously that is important.

Just in closing, we urge the Federal Government to continue its participation in the Federal, regional and State partnerships to improve inner-city passenger and freight transportation throughout the Northeast corridor.

The subcommittee has recognized the critical role of IVHS programs in our transportation system and we are extremely grateful for the congressional support for the I–95 Corridor Coalition. We believe it provides the best example for a comprehensive, multimodal regional approach to intelligent transportation systems in one of the most congested regions of the Nation, and the willingness of the 30-plus individual members to look beyond their in-State needs to the overall region has really been gratifying as a member of the coalition. The continued congressional support of this program is vital to our Nation's and region's best interest.

Again, as part of my submission, a full statement and a copy of our business plan is provided for the committee's information. And I thank you.

Mr. BORSKI. The Chair thanks the gentleman.

Mr. Edelman.

Mr. EDELMAN. Mr. Chairman, I am Matt Edelman, General Manager of TRANSCOM. I am accompanied today by Tom Batz, TRANSCOM's Manager of Technology Development.

I appreciate the opportunity to testify in support of U.S. DOT's program to implement Intelligent Transportation Systems and to discuss the importance of multi-agency coalitions in implementing this technology.

It is particularly fitting that we appear today with the E-ZPass Interagency Group and the I-95 Coalition. While each of our coalitions is focused on a different mission, we share the common belief that some of the most complex issues in implementing this new technology are best addressed on a multi-agency basis.

TRANSCOM itself is a government coalition of 15 major highway, transit and public safety agencies in metropolitan New York, New Jersey and Connecticut. While we function administratively as a unit of one of our member agencies, in this case the port authority of New York and New Jersey, policy direction and support comes from all of our member agencies. TRANSCOM serves to coordinate the activities of its members during major disruptions to the transportation system resulting from incidents or construction.

As diverse as the 15-agency coalition may sound, the jurisdictional situation in our region is actually far more complex than that. TRANSCOM's operations information center, which is opened around the clock, actually ties into over 100 highway, transit and police agencies.

While this testimony is focusing on TRANSCOM's role as a multi-agency test bed for implementing ITS systems, such a high-tech role is actually a by-product of the low-tech work of incident notification, regional incident management and construction coordination that we do every day.

Through the effective working relationships developed through these low-tech activities, we actually created a organizational infrastructure which could then be applied to do multi-agency implementation of ITS systems.

Working with its member agencies and with funding from FHWA, TRANSCOM is currently implementing a coordinated regional ITS program. One of our largest ITS programs is the TRANSMIT operational test which is using electronic toll collection technology for remote incident detection and traffic management.

Another major element of this coordinated approach for the implementation of ITS in metropolitan New York, New Jersey and Connecticut is the effort which TRANSCOM and its member agencies have under way to produce a regional architecture. This effort has the goal of producing a cooperative multi-agency strategy to enhance the coordination of ITS activities and systems throughout our region, and will lead us to the implementation of linkages among each member agency's systems to provide an integrated and multimodal network. This architecture will ensure that jurisdictional boundaries do not serve to reduce the benefits of such major public investments in ITS.

For many of these FHWA-funded ITS systems, the need for more funding for operations after the deployment stage is a critical issue for TRANSCOM. It is of course a national issue which is not unique to TRANSCOM. Once a program is no longer an operational test, funds will be required if the system is to continue to function. One example would be the TRANSMIT project I just noted.

If TRANSMIT is shown to be successful, that is, if ETC technology is indeed shown to be an effective means of incident detection and traffic management, we will be faced with a dilemma. The good news would be that the operational test was a success. The bad news would be that we have a successful capital improvement on our hands with no sure source of operations funding.

TRANSCOM already receives an extraordinary local funding commitment from its member agencies in the form of dues to support its base operation. While we understand that some categories of Federal aid can already be used for operations, we would also ask that consideration be given for a funding category specifically oriented toward operations of ITS systems.

A related constraint that TRANSCOM faces with regard to the deployment of ITS is the issue of local share. Given the importance of fostering healthy active multi-agency coalitions to implement ITS, consideration should be given to a more flexible set of rules on local share. In TRANSCOM's experience, FHWA has done everything it can to be flexible and supportive within the constraints under which it operates.

To add funds for local share on top of the member agency's dues in TRANSCOM's case could significantly affect the coalition's unique ability to serve as a multi-agency test bed for ITS programs.

We would also ask that the issue of direct FHWA contracting with multi-agency coalitions such as TRANSCOM be considered. Currently all monies are channeled through a State department of transportation.

On top of our host agency, the port authority's procedures, we are faced with having to conform to State DOT's financial and administrative processes as well. Direct contracting would eliminate this additional layer of financial and administrative review and approval and accelerate ITS project implementation.

In conclusion, Mr. Chairman, we are in a period of exciting change in transportation, one in which new technological solutions often require new organizational approaches. We very much appreciate the opportunity to be here today.

Thank you very much.

Mr. BORSKI. Mr. Zimmerman.

Mr. ZIMMERMAN. Mr. Chairman, my name is Michael Zimmerman. I am Director of Administrative Services for the New York State Thruway Authority. I also have the pleasure of being the chair of the E-ZPass interagency group policy committee. It is representing that group that I am here with you today.

I would like to first tell you who the E-ZPass inter-agency group are. They are seven toll agencies in New York, New Jersey and Pennsylvania. The New York State Thruway Authority, the New Jersey Turnpike Authority, the New Jersey Highway Authority, which operates the Garden State Parkway, the South Jersey Transportation Authority, which operates the Atlantic City Expressway, Pennsylvania Turnpike Commission, the Triborough Bridge and Tunnel Authority, now known as MTA Bridges and Tunnels, and the Port Authority of New York and New Jersey.

Collectively, we process about 1 billion toll transactions a year. That represents around 40 percent of the entire Nation's toll transactions annually, and about 67 percent of the revenue collected in tolls annually.

As my friends from IBTTA here will tell you shortly, I am sure, there are no free roads in this country. If roads are not supported by the taxpayers, then they must be supported through some other type of strategy. User fees or tolls certainly fall within that category.

But the toll agencies that I represent, as well as those around the country, face the same types of problems that the tax-supported agencies do, namely, that we can no longer afford to continue to build to meet the capacity demands that are being made of us. Even if we have the money to do that, which we generally do not, we don't have the space to do that, New York City being a case in point.

The inter-agency group recognized a few years ago that it was going to have to pursue alternative strategies. Certainly, transportation technology percolated to the top immediately and the E-ZPass group was formed at that time.

Its goal is to install a regional system of electronic toll collection (ETC) throughout the New York, New Jersey, Pennsylvania region. The benefits of electronic toll collection are perhaps well-known, but I think they are worthy of restatement here today.

The principal goal is reduction of toll plaza congestion. A good toll collector operating a manual link can process around 350 vehicles an hour. An ETC system in that same lane, not using open highway-type toll collection but in a same traditional toll lane, can process around a thousand vehicles an hour.

Certainly, improved air quality is a major consideration these days. Mitigation of the need for costly plaza expansion because of that improved capacity. Improved convenience for both commercial and passenger customers, and improved economies and efficiencies in toll collection—the type of thing you were talking about earlier, Mr. Chairman—they are certainly evident in electronic toll collection, and facilitate certain management traffic management functions which can utilize toll collection as a backbone.

My written statement contains some of the history of the group and I won't go into that here today, but I would like to focus on several of the problems that we faced as a group, particularly with

respect to our relationships with the Federal Government in this project.

Perhaps the foremost among those problems was the occurrence in the middle of our procurement activity, which has lasted now several years, of a notice of proposed rulemaking issued by the Federal Communications Commission. It was responding to some actions on the part of competing commercial vendors, and the FCC issued a proposed rule which would have hampered the ability of electronic toll collection systems to operate within the 902 to 928 megahertz band, which is where most of them do operate.

In addition to the decrease of functionality that was going to result from that proposed rule, there was also a requirement that existing systems currently in the 902 band cease to operate in their current configuration and conform to the NPRM within three years, which is an extraordinarily short period of time.

The IAG, as we are now known, or are commonly known, has been very active in its opposition to that rulemaking. The main focus of our comments is not to deter the FCC from resolving some of the problems in the 902 to 928 megahertz band, which is a very congested band and certainly is in need of attention, but rather to recognize that there is an investment being made around the country, not just by the E-ZPass group, but by toll highways all over the country in these systems, and it is imperative, from my thinking and our thinking in the group, that these systems be allowed to live their normal useful life.

An investment of this magnitude would normally have an expected life of around eight years, perhaps 10 years, and to expect the toll agencies to swap that out for new and expensive equipment, if indeed that equipment is even available from the manufacturing community, is simply unrealistic.

In a second area, IVHS systems or ITS systems as they are now coming to be known, are fairly recent phenomena with respect to Federal funding. The gentleman from the General Accounting Office gave you some numbers comparing 1990 to 1993, and there was a substantial change there.

The Federal Highway Administration and the State Departments of Transportation through which have FHWA money flows are much more used to dealing with typical construction and rehabilitation projects. These technology projects are sort of a—the new thing for them, as they are for us.

I think what has happened here is that a lot of the procedures, the traditional procedures have been used to force-fit these new technology projects, and I do believe that the FHWA has come to realize, as have the agencies and hopefully the DOTs, that technologies need processes and procedures of their own. They have unique requirements, unique circumstances, and what may make eminent sense for a construction project perhaps makes no sense at all for a technology project.

I do believe the FHWA has recognized that and is moving forward and will continue to do so as these projects become even more commonplace.

Finally, some of the Federal requirements hampered us somewhat in our in negotiations with the vendors who were competing for our project. For example, the FAR a requirements, the Federal

acquisition regulation, was a mystery to these vendors. They had not previously participated in Federal acquisitions, Federally funded projects, and the prospect of restructuring their entire accounting systems and the expense associated with that was kind of frightening to them.

Perhaps more so, however, was the issue of developed products moving into the public domain. The rationale certainly seems to make sense, that is, if the Federal Government is funding the development of a project for another agency of government, that that product should be available to all public agencies who want it, and while I endorse that concept, I also believe and the inter-agency group believes, that it does stifle the creative process in the private sector, that there is perhaps not the motivation of full and undiluted profit that often is motivating companies to do R&D work that is necessary.

We are suggesting that perhaps there is a middle ground that might be reached here so that—I am not exactly sure what it would be, but perhaps these products would move into the public domain at some later point but allow the companies to develop—or not to develop, but to realize some profits in the short term.

We believe that the lessons we have learned have been substantial. I think that the advent of regional coalitions such as those that are sitting here before you today are clearly among the answers to some of the transportation problems in this country.

The lessons we have learned, I believe, will serve us extremely well in the years ahead in the Northeast. I think that they also will provide the basis for future coalitions, not yet formed, or perhaps even common projects between some of the coalitions that already exist, such as I–95 and TRANSMIT—or TRANSCOM, rather, since we are all in the same region.

We are also extremely pleased at the prospect of serving as the backbone for traffic management activities. Mr. Edelman mentioned TRANSMIT. My own agency is operating an interim electronic toll collection system on the thruway and it will be the backbone for TRANSMIT, which is a Federally funded operational test whereby our tags, 50-some thousand of them, will be used as anonymous probes throughout the region for the purpose of incident detection.

We very much appreciate the opportunity to be here today and be heard, and when the time comes, should you have any questions, I would be more than happy to answer them. I would also like to offer the committee individually or collectively the opportunity to come and visit us in the Northeast as our system is built out, or before then if we can be of any service to you.

Thank you very much.

Mr. BORSKI. Thank you, Mr. Zimmerman.

Mr. Johnson.

Mr. JOHNSON. Thank you, Mr. Chairman, Members. I am Alan Johnson, Executive Director of the Ohio Turnpike Commission. We operate the Ohio turnpike, which is one of the major links of the interstate system in this country. I appear today, though, as past president of the International Bridge Tunnel and Turnpike Association (IBTTA), and as the current chairman of its government affairs task force.

With me is Neil Schuster, who is the IBTTA Executive Director.

IBTTA is the trade association representing the worldwide toll industry. We have members operating toll facilities in 23 countries on five continents. More than 50 of these toll agencies are in the United States and they operate facilities that carry more than three and a half billion vehicles annually.

We believe that this testimony here today and this meeting by this subcommittee is on a very important topic. We are proud to say that toll facilities consistently have been the leaders in testing and installing many of these new technologies.

IBTTA is a founding member of IVHS AMERICA and participates actively in that work. Not only in the United States, but around the world, are a number of these ETTM systems being developed. IBTTA has served as a coordinating agency for these activities. In fact, just this week, we held a forum here in Washington of toll authority executives from around the United States, attended by more than 100 people, to discuss problems that they have encountered in implementing these technologies.

Last year, IBTTA held an ETTM symposium in New York City that was attended by representatives from 15 countries and in fact that symposium had the highest attendance of any IBTTA meeting ever held.

I won't go into some of the elements that have already been covered, mainly by Mike Zimmerman, on the benefits that derive from ETTM systems on toll facilities. As he has described to you, the benefits in handling traffic can be enormous. As he said, going from 350 vehicles in a manual lane to possibly a thousand vehicles in automatic lanes.

At least 10 agencies have installed these systems here in the United States and many more are in the process of being installed. Our written testimony includes a summary of these operations and we would like to submit for the record today—a just released IBTTA survey which provides detailed information regarding existing and proposed systems at many of the facilities in the United States and also foreign facilities.

My own agency, the Ohio Turnpike Commission, is also working to implement an electronic toll system which will be unique in that we classify vehicles on our road by weight, and in that respect, the technology that we are using and which is being developed is being done to be compatible with another IVHS project, Advantage 75, which will pass through the country on Interstate 75 and through our State.

The subcommittee posed several specific questions which we would like to address at this time. One was on the coordination of standard-setting processes. The subcommittee has heard of the IVHS AMERICA efforts and other organizations that are involved in the standard-setting process on a national and international level.

At the present time, however, there are no national standards for ETTM applications. While standards are desirable to encourage wider use of these technologies, the significant investments made by many facilities in acquiring systems should be recognized and accommodated in any final standards that are established.

The progression towards adopting national ETTM standards and other IVHS technology should recognize these capital investments and allow reasonable time for existing facilities to conform.

Another question was what major constraints have been identified to the deployment of intelligent transportation system technology. The major constraints on deployment of ETTM systems have involved the uncertainties around the new technology, as well as concerns over certain Federal actions which Mike Zimmerman has also described that are necessary to make these systems function efficiently.

Specifically, there are the actions by the FCC in allocating radio frequency spectrums. Though it is not an issue directly within the jurisdiction of this subcommittee—it does represent a major issue of concern for many of the ETTM activities which our members are involved in.

Another question is, what plans do you have to coordinate the deployment of IVH technology and services for electronic toll collection. How many States have already developed their own standards and are these standards compatible?

There again, are efforts, much like Mike has described them, for the formation of coalitions that are attempting to coordinate efforts so that these systems can be used through different facilities and across state lines. There are many manufacturers of ETTM systems which are based on differing technical approaches to data communications and handling.

Included within our written statement is a listing (attachment A) of U.S. toll facilities which are currently using ETTM systems or are in the process of choosing or installing a system and a manufacturer of the systems being used.

As independent agencies, toll facilities choose an ETTM system based on a number of factors: their particular needs, traffic and geographic conditions, perceptions of what future information or service needs, the ease of implementation, and price. The basic motivation, of course, for using them is to improve efficiency of the facility, to make it a more attractive and desirable route for the customers that use them.

The desire and ability to coordinate services and technology between agencies will reflect their proximity to other agencies using or planning to use ETTM and the degree to which they share customers and the type of ETTM systems which have been installed.

Mr. Chairman and Members, we appreciate this opportunity to share some of our experiences and concerns with you. We welcome your interest in seeing these applications put to work for the traveling public and we would be pleased to answer any questions you might have.

Mr. BORSKI. Thank you very much, Mr. Johnson.

Let me start with Mr. Reich, if I may. Have you tried to get all the I–95 corridor members to adopt a common electronic toll collection standard as the inter-agency group has?

Mr. REICH. Given that the major players in the corridor are already working on this issue, the coalition, and again my agency's position has been that there will be an opportunity to get in once the standard has been established, and obviously there are many of us who think that that will become the de facto standard.

As was explained, 60 percent of all the national toll business is coming through those plazas and those agencies. Again, all the members of E-ZPass sit on the coalition, so, in effect, that is what the coalition is doing—monitoring what had been going on long before the coalition was even formed.

Mr. BORSKI. Is there any resistance by any particular agency to not join in on that effort? What occurs to me as I travel the I–95 corridor in coming back and forth, you kind of get stuck in Delaware paying a toll.

Mr. REICH. Not in Maryland, Mr. Chairman.

Mr. BORSKI. Maryland does pretty well.

Mr. REICH. Thank you.

Mr. BORSKI. But sometimes in Delaware for an extra quarter, it seems to me, you wind up stuck in a huge traffic jam. The same thing could occur, it seems to me, if everyone but Delaware would choose a system that were compatible. You could still sit in traffic in Delaware. Are you going to assure me that that is not going to happen?

Mr. REICH. I can assure you that we are going to do everything we can to make sure that doesn't happen. Obviously, all of us in this business don't want to buy the eight-track if everyone is going to have the compact cassette or buy vinyl if it is going to be CD. But again, it depends on what application these systems could be used for.

In the corridor, clearly there is a big need. There is lots of interstate travel including sections of I–95 that I am responsible for. Thru traffic can represent, on some sections, only 20, 25 percent. The other 80, 85 percent of the traffic are local commuters and I think that some systems have been and may be developed to serve a little bit different market than, say, for commercial vehicles or the interstate traveler.

Clearly the need for what you just described not to happen or for someone to have 80 different tags stuck on their windshield as they try to get from Maine to Florida is not something any of us want to see. But as we grow, will there be a couple of different formats? I can't guarantee that won't happen. Ultimately I think we all believe that we need to be where you want us to be.

Mr. BORSKI. Mr. Edelman, in your statement, you say the key part of your incident management system is highway advisory radio. I understand that these radio stations only have a power of 10 watts and that their range is only three miles. How useful can they be to drivers if they have such a short range?

Mr. EDELMAN. For the purpose intended, for which they were constructed, 10 watts is adequate. Now, that purpose is to put a highway advisory radio system (HAR) at a key decision point in a high incident area in the regional traffic management system.

As an example, for the New York Thruway Authority, TRANSCOM remotely operates the Spring Valley, New York highway radio advisory system on the New York Thruway. The purpose of that system, combined with flashing lights at the end of that three-mile radius, is to tell people to tune to an emergency message which will advise people of problems ahead so as to avoid secondary incidents equally important, is to use that HAR for people at that point to alert them of problems downstream.

As an example, if the Westchester expressway on the other side of the Hudson River is closed, we will mobilize that radio system on the west side of the Hudson River. This will advise people to use another way of crossing the Hudson River because the adjoining roadway on the other side of the Tappan Zee Bridge is closed.

So for what it is, a very focused decision point tool, almost like a variable message sign but with more message capability, it is adequate.

The 10 wattage itself is adequate for the three miles. Often the problems with the transmission have to do with the transmission itself and not the wattage. In a region such as ours, which is very crowded with radio stations and a growing number of highway advisory radio systems (HAR), were we to increase the wattage, my concern is systems would be bleeding upon other systems.

Mr. BORSKI. Don't you have the problem, though, that by the time you can tune into the station, you are already in the traffic jam?

Mr. EDELMAN. It really depends on how far the radius is to the decision point. For example, the Spring Valley system is quite adequate if there is a closure on the George Washington Bridge. If I am on the New York Thruway, within that three miles, I will hit so many other decision points and so many other alternate roadways, that I will know, for example, to either stay on this roadway and take the Tappan Zee, or take the Garden State Parkway to the Lincoln Tunnel or the George Washington Bridge.

So for a broad-based regional system, you are right, it doesn't do it. For a pinpoint specific location, it is adequate. But I should add that when you take all these HAR systems and view them collectively, as TRANSCOM does, you can reach other people upstream. So, for example, on Interstate 80 way out in western New Jersey, even if it is for an incident 30 miles to the east on the George Washington Bridge, TRANSCOM can also mobilize that system way in advance.

So you have to view it not so much as a single high-wattage system, but a series of systems, each 10 watt HAR at key decision points in the regional transportation system.

Mr. BORSKI. Does it work as well for the long-distance traveler as it does for the local user, or does the local user tune into a local radio station?

Mr. EDELMAN. I think they serve different purposes. The long-distance trucker and the local commuter are both very street smart. Perhaps the long distance vacation traveler is not.

The nature of the flashing lights, for example, on the HAR system I talked about on the New York Thruway is to basically say, listen to and enjoy your local radio station. Listen to those 10-minute traffic reports, get the regional view. But when these flashing lights light up, it means there is something that directly affects you, Mr. and Mrs. Motorist, as you approach this decision point.

Mr. BORSKI. I understand that in Minneapolis-St. Paul they use one of the public radio stations to broadcast traffic advisories all over the metropolitan area. Have you considered using such a station for a metropolitan area-wide broadcast, and has FCC licensing policy been an obstacle to such a program?

Mr. EDELMAN. Mr. Chairman, in this case, since I have 15 member agencies, I can only speak for myself. In a large coalition such as ours, we call ourselves the United Nations of transportation. And unlike the United Nations, we don't pretend that we have unanimity all the time.

So given the fact that I can only speak for myself, my opinion is as follows. When you go from a pinpoint-specific kind of system that I talked about to a broad-based system, you are in effect creating the traffic channel, or radio version thereof, and to a certain extent, you are going up in competition against the media traffic services.

There are a few ways of dealing with this. One would be, if the member agencies in our region chose to do it, to actually put it up to bids for one of the traffic services. They have much more marketing communication skill than we government types have to operate it.

But to me the main thing to keep in mind for metropolitan areas such as ourselves, and perhaps for others, is that it is essential for us not to compete with the metropolitan area's traffic services. That is because, even with IVHS, it is going to be a very long time—perhaps never—that the entire system, transit and highway, is instrumented. We are always going to need alliances with those traffic services, with their stringers, with their helicopters.

In effect, right now, the governing agencies barter information with the traffic services. We need each other and I think we are always going to be at that point where we need to get along well together.

Mr. BORSKI. Mr. Johnson, your members mostly use the Amtech system for electronic toll collection, and, Mr. Zimmerman, your group has chosen Mark IV for your members. Your members have seen the advantages in these two systems.

How do we set a standard that will allow all of your members to benefit from the advantages of these two different systems while still achieving compatibility between the two systems?

Mr. ZIMMERMAN. Well, Mr. Chairman, let me first point out that in comparing the Amtech and the Mark IV systems that are in place in this country is somewhat like comparing apples and oranges. The two systems we tested were both read-write systems, whereby the tag is capable of being read and also capable of having messages written to it. Both companies are developing or have developed those types of systems and we tested them and found them both to be satisfactory for our purposes.

But some of the other installations throughout the country, a number of which are Amtech, are read-only systems. They are capable only of being read and they do not lend themselves to utilization on the ticketed system, like thruway and the New Jersey turnpike and the Pennsylvania turnpike.

Clearly these two types of systems are not compatible. A truck coming from Oklahoma, for example, with the Amtech read-only system cannot be read on the thruway's Mark IV system. But on the other hand, I think we have to recognize that these are the cards that have been dealt to us at this point. These are the products that have been developed by industry. These companies have

all gone in slightly different directions but they have all developed viable products.

I think that the movement toward national standards is an important one. You heard IVHS AMERICA's representatives talking about the efforts that have been undertaken by their standards and protocols committee. We in the E-ZPass interagency agency group were represented on that committee and participated as users of these systems in the development of those standards.

We think it is key to the success, or key to the attainment of our vision, which is national electronic toll collection utilizing systems which are interoperable throughout the country, we think that is critical for the commercial industry, commercial trucking industry, that that occur.

I think that all of us users, all of the vendors, have to participate in the development of these standards, but, again, our caution is that we not jump so quickly to adopt them that we compromise the ability to operate the existing systems that are in deployment now or already in utilization now.

There is a lot of money invested in there and those systems need to be given the opportunity to play out their normal life expectancy. We view the next generation as the generation where the standards will be adhered to.

Mr. BORSKI. Mr. Johnson.

Mr. JOHNSON. Mr. Chairman, I think he covered the question quite adequately. I do want to point out, because you did mention when you first posed the question with my name that our association was connected somehow with Amtech. That is not the case. Our members have all these various systems.

Of particular interest for me specifically on the Ohio turnpike, the system that we are testing is neither one of those two. It would be a read-write system as I explained earlier, that has the further complication of having to classify the vehicles by weight. IBTTA is very interested in—I say in this coordination effort, the standards effort, and that is why we have an ETTM task force. That is why we have all these symposiums and meetings to try to bring all of the various toll agencies together to address this problem, and as Mike has said, we are playing with the cards that we have been dealt. Every system has got a little difference to it.

They classify differently, and we will never get total unanimous decision on a single system, but I think working together as we are, we are going to do the best we can.

Mr. BORSKI. You mean we won't get there now but eventually we will?

Mr. JOHNSON. Beg your pardon?

Mr. BORSKI. We won't get to a system that we all could use in the near term, but ideally, in the longer range? In other words, a long time?

Mr. JOHNSON. I doubt if we will ever get a single system that handles everything.

Mr. BORSKI. Mr. Reich, many of the IVH system applications will occur in metropolitan areas and it seems appropriate for the MPOs to be involved in the deployment of IVHS technology. What role are the MPOs playing in the I–95 Corridor Coalition? Are they involved in the IVHS planning and funding decision makings? And how are

you coordinating with MPOs and States to determine priorities for the corridor?

Mr. REICH. To the extent that the I–95 corridor is one of the four priority corridors and we do employ the use of Federal highway funds or transportation funds, obviously, each one of these projects needs to be worked through their respective MPOs. We have therefore asked each of the member agencies that are State DOTs, to handle the coordination with the MPOs since agencies like myself are not used to—before ISTEA and before Clean Air Act amendments, to play in that arena. Clearly, it is an issue.

We would prefer and advocate frankly that in the next reauthorization, that IVH funding be specifically designated for IVHS, as opposed to some of the more general and generic kinds of funding mechanisms that ISTEA set up, only because, again, if we have a plan that we want to realize, it sort of lessens the competition.

I think that again, to make a short answer, to the extent that the Federal funds are being utilized by the coalition members on these specific projects, we obviously need to go through the SIP and TIP process that each of the MPOs have up and down the corridor.

Mr. BORSKI. Mr. Edelman, you mention on page five of your testimony the Alternative Bus Routing System. Could you tell us a little bit more about that system?

Mr. EDELMAN. Yes, Mr. Chairman. The roadways leading northbound, the Garden State Parkway and parallel U.S. Route 9, for a few miles, feed into the New Jersey Turnpike at Interchange 11. It is a very high area for bus demand. We all talk about using IVHS/ITS for giving transit a leg up and that is the goal of this operational test.

Now, for the number of miles leading toward this interchange, on a given day, parallel Route 9 or the parallel Garden State Parkway can be congested to different degrees. There is a point in between about a mile or two south of that interchange where a vehicle can switch from one approach road to the other.

The idea here is, working with New Jersey transit and some 400 of its buses, to use cameras for incident verification and radar for incident detection and to communicate with the buses through Hughes transponders. This is a way of quickly, almost instantaneously, getting information on the backups on each of those two approaches and giving that data instantly to the buses before they reach that decision point.

Depending on conditions, the goal is to save buses some five to 10 minutes on any given day. In effect, give them a leg up on other vehicles in the traffic stream.

Mr. BORSKI. Mr. Edelman, you have had a lot of experience at TRANSCOM with various IVHS technologies. In your experience, which IVHS technologies have worked well and which ones haven't worked as well as expected?

Mr. EDELMAN. Well, things are evolving so it is hard to take this at a given point in time. Indeed, as a region, we are only implementing them at this point. The systems that are in use right now, and we only have two instrumented systems in the New York region, are the induction loops on the New Jersey Turnpike and the INFORM system on Long Island, which are both pioneering systems.

Each of them is clearly a major step over not having any IVHS at all, just by the fact that our instrumented members get to our regional coalition with incident information much more quickly. So while I don't think anyone pretends induction loops are the sole system for the future, thank God we have them.

Now, certainly one thing that we are very enthusiastic about is cameras throughout the region. Cameras will give our members a means of incident verification on top of the detection. For example, a camera that we had that we shared with the Port Authority helped us to monitor the progress of uprighting an overturned dump truck on the helix from the Lincoln Tunnel.

Instead of calling all the time and asking for updates, the idea that different agencies can share the same visual information helps everybody do their job. We have an FHWA funded project, the goal of which will be to get video in from an increasing number of cameras into the region, not just into TRANSCOM, but sharing it among all the members.

With regard to highway advisory radio and variable message signs, there are endless debates among traffic engineers about which is better. The thing that we find excellent about something like a highway advisory radio system is shown by our experience with keeping motorists away from lower Manhattan for a tickertape parade that was held for the New York Rangers. The beauty is that highway advisory radio can give highly sophisticated, diverse messages. For instance, a truck needs to use a different route to avoid the area of the tickertape parade than a car. In contrast, the beauty of a variable message sign is that while you may choose not to turn on your highway advisory radio, the variable message sign is something that you cannot deny the existence of and you will have to pay attention to. So each one has its pros and cons.

So much is coming on line in the next few years, I would like to answer this question on a yearly basis. We are certainly particularly excited for the first time about having E-ZPass tags available and being able to use tagged vehicles as a new form of probes. These will supplement and build on technologies like induction loops, in effect, letting the vehicle be smart, rather than the highway.

Mr. BORSKI. Let me ask you, do each of you have a comment about what I asked earlier about who will pay the cost of the maintaining and operating the system after it is deployed, particularly in the urban areas where there is such fierce competition for dollars? Mr. Zimmerman, you want to start up?

Mr. ZIMMERMAN. Well, being a very strong proponent of user fees, coming from a toll agency, I envision a combination of payment methods. Clearly the authority, as part of its own investment in transportation and transportation mobility, is going to be paying part of the costs of its IVHS initiatives, but so, too, I believe are the users of some of those initiatives.

Electronic toll collection is a case in point. There is a cost to the customer, at least on the thruway authority there is. And I also think that in time, more public private partnerships will develop and that the costs will actually be split three ways. There will be costs that will be borne by the private interests that are investing

in these systems, by the agencies who are their clients and then by the users.

Mr. BORSKI. Mr. Reich.

Mr. REICH. Just a quick comment in that if you take as a given for a second the level of public investment in transportation, that historically has barely kept pace, there has been a significant increase in the last decade or so. Investment in this kind of technology, as opposed to the physical concrete and mortar stuff, (which never gets cheaper and never gets easier) these typically are wise investments. When you look at your HP calculator you bought in college that cost you a couple hundred dollars and now you can get the same technology for $3, I think it is a wiser investment in public funds to track along something that as the market begins to accept these and the cost of manufacturing goes down and it becomes more commonplace in the market, it is a heck of a lot smarter than trying to stake our future in adding more lanes or thinking about bizarre things like double decking freeways, which environmentally can't be done and then from a cost standpoint, you know it is never going to get any cheaper.

Mr. EDELMAN. Mr. Chairman, if I could add, those of us in IVHS, in the ITS at the regional level really feel we live in two worlds sometimes. We live in a growing business of ITS, with growing interest and growing capital resources, and we are constantly living in a shrinking business called State and local government in which, among our member agencies, we are facing layoffs. The very agencies that funds us a very significant amount every year are also choosing between funding us and their own concerns for maintenance and their own concerns for staffing and maintaining a critical core of engineering talent.

So having funds for operations of systems is something that we as a coalition are going to have to wrestle with, and I think everybody across the country as budget constraints increase on local and State governments.

From a positive standpoint, it is our hope that this technology can improve the productivity of incident detection and that perhaps less field forces would be needed to detect an incident.

Some of the agencies we deal with, particularly the inner-city police departments, it is very, very hard right now as they patrol the primary highways to ask them to focus on call-in incidents and ask them to focus on issues like that when they have competing needs off those highways for the needs of an inner-city police department. Perhaps a range of instrument technologies would permit them to call in information, monitor information on the transportation system while still focusing on perhaps more critical needs.

Mr. JOHNSON. I think that most toll agencies are looking at these systems as being a tremendous potential cost savings tool and would be willing to invest in these systems from that basis. The cost savings, of course, result not only from not having to expand facilities, but from manpower aspects.

So in the absence of any other source of funding, Federal or otherwise, I think most toll agencies would be willing to foot the bill along with some user participation, as Mike Zimmerman has pointed out. There is a cost of the equipment and the vehicles and for the most part, those costs are borne by the user.

Mr. BORSKI. All right. Let me thank you all. I am going to stop here for a call to the House that is going to take some time, and thank our panelists for their input.

Mr. BORSKI. For the future panelists, we will break now for about an hour, try to reconvene around 1 o'clock.

And again, let me thank you very much for the work you are doing and for your testimony today. It is most helpful.

The subcommittee stands in recess.

[Whereupon, at 12:00 p.m., the subcommittee was recessed, to reconvene at 1:00 p.m., this same day.]

Mr. BORSKI. The subcommittee will reconvene.

Mr. Chamberlain, may I ask you to rise, please?

[Witness sworn.]

Mr. BORSKI. Thank you, sir, and you may proceed.

TESTIMONY OF A. RAY CHAMBERLAIN, VICE PRESIDENT, FREIGHT POLICY, AMERICAN TRUCKING ASSOCIATIONS, INC.

Mr. CHAMBERLAIN. Thank you, Mr. Chairman. It is a privilege to appear with you today and speak on the IVHS issue.

My name is Ray Chamberlain. I am Vice President for Freight Policy of the American Trucking Association.

First, I would like to ask that my written statement simply be placed in the record.

Mr. BORSKI. Without objection, so ordered.

Mr. CHAMBERLAIN. Thank you very much.

I propose to speak only to the commercial vehicle operations portion of the IVHS issue and not to the total program as those who testified this morning—so solely the commercial vehicle operation segment.

I would like to suggest that the operational record shows that the commercial vehicle operating community is probably the area of business that has most aggressively and is currently using a number of IVHS technologies, especially those IVHS technologies that seem cost effective, enhance truck safety, provide a perceived competitive advantage or induce maintenance to serve clean air objectives.

Obviously, with that record, we believe in the appropriate development and deployment of IVHS as a very major economic and social activity of this Nation. We also believe that there is lots of technology hunting for a problem, and there also, of course, are other problems hunting for a technology to help.

So we summarize this in a context of suggesting that the major goal of IVHS, as you yourself outlined it this morning, is to improve the mobility of freight, people and information in ways that will contribute positively to the goals of productivity, highway safety and the physical and biological environment which is so fundamental to our quality of life.

We think, however, that the achievement of this goal through IVHS may show that the greatest benefit of IVHS itself may be its role as a catalyst to eliminate the institutional barriers or at least reduce the institutional barriers that induce so much inefficiency today. We think that this effect, when coupled with introduction of quality management concepts to the public sector as they are being

applied in the private sector, can do a great deal to make IVHS a major instrument of public policy.

We think it appropriate that, on the one hand, we strongly encourage advanced technology, but we think that the premature deployment is an expensive and inefficient way to go compared to the necessity of introducing technology only after there are certain standards and protocols that have been put in place in order to make the priority setting of appropriate technologies fairly practical and feasible to do.

So in that context, then, what basically do we believe are the essential criteria for an appropriate IVHS for the commercial vehicle operation sector? We think there are actually four key areas that need to be looked at, at least as we see it from the private sector. Three of these are policy items and one is operational. Let me speak to these four points.

The first is that each technology really needs to be cost effective. Each IVHS technology has to be cost effective in the marketplace of the intermodal competitive freight industry in which logistics is ever more significant to the customer or the technology will not be voluntarily used by an industry such as a freight industry that typically is operating with as little as a 2 percent average margin. So cost-effectiveness is one key criteria, as measured in the private market.

Second, compatibility or interoperable characteristics. This was alluded to by some of the witnesses this morning. The equipment just has to be compatible or interoperable across jurisdictions.

One of our firms that I talked to a couple days ago said that they were being pressed to buy four different transponders in order to have their trucks be able to cross the country. Well, multiplying four transducers or transponders at $30 to $100 apiece times a few thousand units becomes big money, at least to private firms, because it is not practical to hang a different gadget for every jurisdiction on every truck with all of the negative behavior that that can induce.

So compatibility and inoperability is a second criterion. This, in effect, is saying that the emphasis on architecture and protocol development and standards development is essential before massive deployment, partly because deployment is the truly expensive stage, as was again referenced by some of the witnesses this morning.

The third criterion we consider very fundamental is the issue of it being voluntary insofar as the members in the private sector are concerned. That is, the technology needs to be available for acceptance and use by the individual carrier firms rather than it be mandated to use what may or may not be a cost-effective technology.

If it is made voluntary, then the marketplace will determine which technologies developed against appropriate protocols and standards actually survive and provide to our Nation the most productive and efficient economy, but it is also essential to this point that the freight industry be recognized as being some quarter million legal entities. Therefore, no one single technology can necessarily serve all of the diversity within this industry, so the voluntary characteristics are important in part because the technology that is valuable to one segment may be a negative to another seg-

ment, but if it is left voluntary, then the market itself will determine the ones that are appropriately picked up.

And the fourth operational characteristic is that, whatever the equipment is, it needs to be durable, reliable and relatively free of maintenance. This, again, is essential for all of the equipment if it is to meet the needs of the private sector, be cost effective and appropriately contribute to safety.

So this leads us to a strong recommendation. That is, the belief that the IVHS work now under way on architecture protocol and on standards is absolutely essential and should be supported aggressively.

Further, we strongly endorse the FHWA IVHS committee known as the IVHS CVO subcommittee, which met for the first time last week. The membership of this subcommittee includes freight carriers, customers, if you will, as full participating partners. We consider this a very positive move by FHWA and it provides a positive opportunity for carriers to be at the table for program planning of the future of IVHS.

Now, let me share with you three of many, but three specific IVHS areas which seem to show great promise to the commercial vehicle operations community. Of course, there are more areas that will develop as architectural protocols are developed and as standards evolve and as field prototype experiments weed out some of the winners and some of the losers, but all of this activity still seems to lay a foundation for then appropriate deployment strategies.

Let me deal with one of those that probably you have heard a great deal about because it was referenced by your colleague this morning insofar as the aviation business is concerned, and that is the global positioning system as the backstop for vehicle location systems.

Vehicle location systems we consider one of the very affirmative contributions that IVHS is and will continue to make to the freight industry. But the global positioning system is supported by Congress and, as you probably are aware, jointly operated by the DOD and the DOT. This is extensively used by our larger firms that have equipment especially moving over long distances. The equipment allows a firm to know where its equipment and freight is located.

But it is more than that. It permits management to enhance efficiency and safety while giving value added to a shipper in our just-in-time economy.

The second area showing great promise as we see it is the traffic information services. This is valuable, and it uses a whole array of communication technologies ranging from simple cellular phones to somewhat more sophisticated and localized systems, and in some cases, also includes what is typically referred to as differential global positioning system technology. It allows traffic, weather, incident data, so on, to be conveyed to drivers so as to minimize driver delays.

The third element showing a great deal of current promise is specifically automated roadside safety inspection. Here is a set of developing IVHS technologies that we believe are a win-win for both

the public and the private sector. Safety pays. While there will be problems, we think there are some real future winners here.

So, Mr. Chairman, I have given you these three areas, vehicle location systems, traffic information services and automated roadside safety inspection, as just illustrations of positive benefits.

Now, there are some disbenefits in that some technologies, especially if inappropriately used for fulfillment of some archaic or irrelevant administrative purpose or regulatory purpose we would consider highly negative to productivity and competitiveness.

So I summarize with just three points. IVHS commercial vehicle operations is and will contribute much to enhancing the safety and productivity of intermodal freight mobility in an environmentally sensitive and socially responsible manner.

Number two, architecture protocols and standards with carrier input are essential before huge sums are invested in deployment. While this predeployment work of standards and architecture is being done, much effort can go into rethinking institutional processes for elimination or streamlining before automation investments.

And, third, clearly from my remarks I hope it comes across that the ATA and many, many of its 40,000 member firms intend to be an active partner in IVHS in the years ahead.

Mr. Chairman, with that, I would thank you for the opportunity to appear on behalf of the American Trucking Association and will be pleased to respond to any questions.

Mr. BORSKI. Thank you very much, and we appreciate it, and I apologize for the delay caused in large part by over an hour's worth of Floor votes. But I appreciate your patience and your testimony.

Mr. BORSKI. Let me ask you, in your testimony you criticize some IVHS applications as being overblown schemes for excessive tax and credential enforcement for the placement of equipment to monitor drivers in every cab or for the creation of massive and elaborate systems to track and weigh vehicles wherever they go. Are you suggesting that IVHS should not be used to improve what I believe to be rather weak enforcement of our truck weight laws, hours of service regulations or other legitimate requirements?

Mr. CHAMBERLAIN. No, we are not approaching it from that point of view. We are approaching it by saying those administrative processes first should be subjected to modern quality management review as to whether they should even be continued in the current regulatory environment.

And then, second, if they are procedures that should be continued as judged by the public policy-makers, that they should be reanalyzed as to the most efficient way for conducting the processes. And at that point you begin to apply the automation power of modern information systems rather than simply saying, here is a process, so let's automate it.

Mr. BORSKI. You emphasize in your testimony the need for usage of all IVHS technology to be voluntary. If use of electronic toll collection is purely voluntary, is there a possibility that usage will not be sufficient to reduce congestion at toll booths?

Mr. CHAMBERLAIN. I don't really think so because, you know, each driver, each firm has to analyze whether the toll on a particular route, which presumably provides a more direct or at least fast-

er corridor, is worth the time and money as compared to the cost of taking an alternative route without toll that probably will be slower and maybe more congested or is narrower and has less safety opportunity and so on.

So we are inclined to believe that, again, the marketplace is the appropriate way to let an individual firm, an individual driver or firm, decide whether that toll is appropriate for them to pay and take advantage of.

Mr. BORSKI. I don't think I am asking that question.

Obviously, you could continue to take routes that have a toll or take another route that doesn't have a toll. I don't think that decision would change at all. The question would be more of, if you are using the toll road, isn't it better if everyone has an IVHS sticker of some sort rather than making it purely voluntary?

Mr. CHAMBERLAIN. Our members are so diverse that their argument is that there are many, many firms which, by the nature of their business, the only way to go would be to purchase a debit card, a smart card, things of that nature, while in other cases they believe that it simply is an invitation to overregulation, whether it be a toll card or a weight check of some kind.

Mr. BORSKI. If we are trying to avoid congestion, it would seem reasonable that if you have a smart vehicle but the 15 or 50 trucks ahead of you don't, you can't get through that terminal any faster, causing the congestion that is caused by others.

Mr. CHAMBERLAIN. Very true.

Mr. BORSKI. The GAO testimony indicated that IVHS commercial vehicle applications receive about 6 percent of overall IVHS funding. Do you think that level of funding is adequate? And do you think that the funding for commercial vehicle application is being used appropriately?

Mr. CHAMBERLAIN. Well, our belief is that the 6 percent is probably all right if it is concentrated not on deployment elements at this early stage but is concentrated in the areas of standards, protocols and architecture.

Mr. BORSKI. And do you think that the funding is being used properly at this point?

Mr. CHAMBERLAIN. The CVO part of it we have no objection to. It is the overall program where we believe that it is, in many cases, premature to consider investments that go beyond field or prototype testing, and commitments to massive deployment at this time are premature.

Mr. BORSKI. Does the current use of the term intelligent vehicle highway systems result in too narrow a focus for the application of this technology? Would renaming the program intelligent transportation system help to overcome some of the skepticism that some groups have about IVHS and better reflect the goals of the program to improve congestion and add safety and improve quality?

Mr. CHAMBERLAIN. In talking to our staff, we generally come down as saying that a change in label such as intelligent transportation system would be appropriate, partly because in trying to communicate to our numerous members, IVHS generally does not convey any message.

At the same time, I think we need to keep in mind that a name in and of itself has no substance, so we think that the name

change, whatever it is, and let's presume it, for the most, is a positive move, but it shouldn't be perceived that it does more than contribute on the margin as compared to the fundamental importance of program content itself.

Mr. BORSKI. Mr. Chamberlain, does the motor carrier industry have adequate input into the standard setting processes carried out by IVHS AMERICA, the States and a group like the I–95 Coalition? Are you running into problems with the States developing compatible standards that require duplicative hardware?

Mr. CHAMBERLAIN. Taking that in two parts, Mr. Chairman, the IVHS AMERICA FHWA activities, we are being given increasing opportunities for participation, literally every month, and so we are feeling better and better about that.

In terms of the individual States, we frequently have not been let in the door until after the decisions have essentially been made. Obviously, that is variable across the country though.

Mr. BORSKI. Is DOT moving fast enough to set standards that would insure compatibility in systems?

Mr. CHAMBERLAIN. Well, we don't think they are moving fast enough. But, on the other hand, they are probably moving about as fast as the complex communication procedures among the numerous participants makes possible. But we would like if it were possible to have seen the standards actually in place two or three years ago, so we applaud their effort for moving as rapidly as they are but still feel that, unfortunately, we are not farther down the road.

Mr. BORSKI. Let me ask you the question I have asked the other panelists so far. Who will pay the cost of developing IVHS technology after it is developed and who will pay the cost of operating and maintaining the system after it is deployed?

Mr. CHAMBERLAIN. Unfortunately, we are all going to pay, and our industry stands on paying its fair share, but we think that that is where it should rest, except that everyone is going to have to contribute. Nobody is expecting a free ride, and that it is going to be very, very vigorous debate on priorities of what we can get out of IVHS to supplement our resources in terms of our economic activity.

But I believe, as others have said, we have to believe that we cannot build our way out of our transportation needs by just moving asphalt and concrete, so we have to be smarter. And IVHS is just one element of being smarter with the hope that if we are collectively smart enough we can meet our economic, social, environmental, people needs in a cost-effective manner that our economy can sustain.

Certainly in our specific area of activity, our firms, when they invest millions in IVHS, they are believing that they are either gaining competitively, they are reducing their costs in some manner, they are reducing their burden on air pollution, whatever it may be, and those have economic values.

I know the testimony this morning emphasized the increases in investment that would be called for, but I would suggest to you that there also are economies that one would hope are fundamental so that it isn't solely an issue of who is going to come up with new money as compared to first looking at procedures that are archaic

or irrelevant, that either don't need to exist at all or can, when automated, save both the public and private sector more money as just one element of contribution.

But the bottom line is still, I think, to sustain the quality of life we want and the environment we want as well as our economy, everybody is going to have to contribute.

Mr. BORSKI. Mr. Chamberlain, IVHS technology has the potential to require a great deal of information on truck routes, schedules and weights. Is ATA concerned about the privacy implications of this?

Mr. CHAMBERLAIN. Yes, sir, we are, partly for reasons of concern over inappropriate disbursal of proprietary information and partly over the potentiality of inappropriate and perhaps adverse use by some of the public regulatory authorities.

We have many concerns in this area and believe that it is deserving of very, very serious consideration.

Mr. BORSKI. And let me ask you, finally, is DOT spending too much time on developing plans and writing reports and not concentrating enough on project development in your view?

Mr. CHAMBERLAIN. Well, coming from the private sector, we always believe that government is spending too much time on reports and planning and talking. As a practical matter, given the overall constraints that they have available, we applaud the dedication and commitment of the public DOT people who are involved, and so we generally are highly supportive, but we think they are probably as hamstrung at times as the rest of our society.

Mr. BORSKI. Okay. There are no further questions, Mr. Chamberlain. We want to thank you very much for your testimony. It has been very helpful.

Mr. CHAMBERLAIN. Grateful for the opportunity to join you, sir.

Mr. BORSKI. Thank you.

Our fifth witness today is Mr. Hank Dittmar, Director of the Surface Transportation Policy Project.

Mr. Dittmar, could I ask you to rise and raise your right hand, please?

[Witness sworn.]

Mr. BORSKI. Thank you, sir.

TESTIMONY OF HANK DITTMAR, DIRECTOR, SURFACE TRANSPORTATION POLICY PROJECT, ACCOMPANIED BY LAURIE GARRETT, DEPUTY DIRECTOR

Mr. DITTMAR. Mr. Chairman, thank you for asking me to appear before you today. I have at my side Laurie Garrett, who is STPP's Deputy Director.

STPP is a nonprofit coalition of over 100 groups whose mission is to reform transportation policy to be socially equitable, economically effective, energy conserving and environmentally sensitive. We are submitting for the record some answers to the questions that your staff posed, and we hope that they are helpful.

[The information referred to is attached to Mr. Dittmar's prepared statement.]

Mr. DITTMAR. In my remarks I would like to speak somewhat more broadly about the overall progress of the IVHS initiative.

I think it is very timely and very appropriate for you to be focusing on IVHS at this time. We are nearing the midpoint of the ISTEA legislation which really chartered the IVHS title, and I think, in looking at how we are doing, we need to really ask three questions.

First of all, are these emerging technologies coming out of the IVHS effort serving the right social goals and objectives? Second, is there a proper structure in place for the evaluation of the impacts of these technologies? And, third, is an institutional framework being developed which will allow us to move beyond research and development into successful deployment?

So I will take those one at a time. First is the question of whether these technologies are really serving the right social goals and objectives. I have spent some time going over the IVHS DOT program plan, and I would say that, while the goals in ISTEA are very broadly drawn relating to the economy and the environment and society, those that appear in the program plan are much more narrowly focused.

The program plan and the system architecture assert that IVHS technologies will improve air quality and reduce congestion, but making the assertion is far different than achieving the results. It appears that many of the technologies propose to achieve these goals by increasing highway speed, reducing the distance between cars and putting more cars on the road. Such a narrow focus for IVHS, I think, fails to recognize the many important objectives that we all hold for our national transportation system.

Transportation policy adviser Donald Camph has called IVHS a double-edged sword offering two possible visions within it for America's transportation future: either more roads with more cars now souped up with fancy technology or an opportunity to harness technology to empower people by providing the access to jobs, to health services, to cultural and recreational opportunities and by helping to address questions of social equity, environmental quality and community cohesion.

I guess we land squarely on the side on asking what it is we want IVHS to do for us. We think that that can best be accomplished by using these technologies to manage and operate the existing transportation system, both as a national system and as a metropolitan system. We believe the real promise of these technologies is in tying our different transportation modes together into one national system and managing it to its highest economic effectiveness.

Such goals would include integrating the different modes, informing the users and operators of the functioning of the system, and creating flexibility and redundancy in the system by lessening reliance on the highway mode. I would submit that you haven't heard much about any of these system goals yet today.

The current package of user services being put forward by FHWA in its outreach looks more like a loosely bundled set of technologies seeking a place on the shelf than a set of applications targeted to meet national goals and objectives. We need to recast the program plan in terms of goals and objectives people care about, not the ones that producers of technologies care about.

My second question is, is there a proper structure for evaluating these technologies? Very briefly, I would like to quote Jerry Mander of the Elmwood Institute which proposes a frame which we might think about the emergence of new technologies:

> Since most of what we are told about new technology comes from its proponents, be deeply skeptical of all claims. Eschew the idea that technology is neutral or value free. Every technology has inherent and identifiable social, political and environmental consequences. Negative attributes are slow to emerge. In thinking about technology, emphasize the negative, because this brings balance.

So I hope today I can bring a little balance to this picture.

STPP fears that the present course of IVHS program development will subject America to the law of unintended consequences. Just as the interstate program succeeded in its primary goal but had unforeseen results in terms of urban sprawl, destruction of neighborhoods and the deterioration of bypassed small towns, so too IVHS can have such impacts. Some of these impacts are the following:

What will happen to all the cars that we crowd onto smart freeways when they leave these high-capacity smart freeways and exit onto small and dumb streets in our downtowns and our suburbs? Are we creating a class-based transportation system with smart drivers and dumb drivers who can't afford to buy all the bells and whistles? And what is the cost and the environmental impact of providing the infrastructure to insure safe access for both smart fast trucks and cars and slow dumb trucks and cars? Who pays and who loses?

Patricia Waller, the Director of the University of Michigan's Transportation Research Institute, notes:

> If IVHS safety technology becomes available only on new vehicles, what implications are there for that segment of the population without the wherewithal to acquire these vehicles?

We need to develop an independent evaluation function for IVHS technologies. It is not reasonable or fair to ask IVHS AMERICA or FHWA to develop, promote and evaluate these technologies. STPP would suggest that Congress require an independent effort to evaluate the social, economic and environmental impacts of the IVHS effort on an ongoing basis.

One example is the automated highway system which, as GAO indicated, is spending about a third of the research and development dollars. This very expensive prototype development project for the automated highway system is currently being evaluated by the vendor, by the person who is charged with building the technology which they hope to sell. We would suggest there is a inherent conflict here and that possibly the group like the National Energy Laboratories might play a role in technology evaluation.

Third, and briefly, I want to talk about the big challenge that awaits us as these technologies are evaluated, and that is the question of providing an institutional framework that will move us beyond congressionally authorized demonstrations into widespread application and deployment, and this is absolutely necessary. We cannot hope to build an intelligent transportation system by responding to very real program needs that come up on an appropriations basis.

Unfortunately, outside of projects that have been authorized, there has been very little rush to integrating these technologies into the long-range plans and transportation improvement programs that are being put together now by the States and the metropolitan planning organizations. This institutional challenge is a real one.

As much of the promise of ITS is in metropolitan areas, it is reasonable that MPOs would have a key role in ITS deployment. However, at this time, nothing in the law makes clear to these MPOs that the management and operation of the metropolitan transportation system is their job, and we have to tell them it is their job if we want them to do it.

Perhaps an overall management system should be created for the metropolitan transportation system with the MPO clearly responsible.

A second key to deployment is to provide clear guidance that funding can be used for these technologies. While National Highway System funds and Surface Transportation Program funds and Congestion & Air Quality Mitigation funds can all be used for these technologies, no guidance has been developed to encourage such use, and States generally reserve these funds for their own capital projects.

Your bill, H.R. 4305, is a step in the right direction in that it specifically makes NHS funds available for ITS technologies and partnerships.

States and MPOs need to be clearly charged with managing their intermodal systems and must be encouraged to do so if necessary by diverting funding from capital expansion projects, which may be unneeded if we meet the—if we meet the possible advantages of IVHS.

I think that—I think this deployment question and this institutional problem is one of the key ones facing us in the future.

Mr. Chairman, thank you for asking me to be here today, and I am ready to answer any questions.

Mr. BORSKI. Thank you very much, sir.

Let me ask you, in your testimony, you emphasized the goal of equitable access to mobility for all Americans. Could you elaborate on what kinds of intelligent transportation technology projects would help to achieve this goal?

Mr. DITTMAR. Well, I think the projects which focus on information, such as the one that Mr. Dahms talked about in the Bay area, the TRAVINFO project, provide information for both transit and highway use and provide options for all users of the system. The key, of course, is getting it to all users of the system.

A second type of IVHS technology that I think would be very positive that we haven't heard about today is technologies which enhance the use of the system by the elderly or the disabled, and there is the ability to use technologies to provide for better use of both the highway transportation system and the transit system for folks with special needs, and I think some focus in those areas is very important.

And, finally, we have to think very carefully about the fact that most of the vehicle control technologies and the things that are in car technologies aren't going to be available to the people who are

driving around with used cars, so we need to think about program offsets or special programs to provide equitable access for this technology to low-income individuals as well.

Mr. BORSKI. GAO indicates that 9 percent of IVHS funding is going for transit applications. Is this share large enough and do you feel that the transit community is doing enough to support the application of IVHS technology?

Mr. DITTMAR. Clearly, I don't think that 9 percent is enough, and I guess I would also note that there is no percentage really being devoted to dealing with social inequity issues. Transit, I believe, is one of the potential key beneficiaries of this program.

Intelligent transportation systems—and I think the name needs to be changed—tells that transportation systems can be about making demand response in public transit work in the suburbs, because they can make this dial-a-ride technology that didn't work 15 years ago work today. We have the computer capacity, the communications capacity and the dispatching capacity to make it work now.

What is needed, I think, is some funding that is targeted to those kind of programs and some incentives to bring the transit industry to the table. They have not been that involved.

I know that Jim Costantino at IVHS AMERICA is reaching out, but I would say that the success of his efforts to reach out is limited, and I think that the only way that is going to change is if there is some targeted programs for transit, if more of the user services are aimed at transit and they see a clear service and monetary benefit in getting involved.

Mr. BORSKI. You mention in your testimony the importance of involving the MPOs in IVHS planning. What role are they playing now?

Mr. DITTMAR. Generally, I would say that the—if the MPOs are involved, it is because they have a demonstration project. It has been suggested that they go to these outreach meetings, but the outreach meetings that have been going on on the program plan have largely been targeted at talking about what DOT and IVHS AMERICA is doing and not explaining the potential benefits and applications of this technology.

I think technical assistance is needed because—in this area as well—because they don't see a clear application to the problems of congestion and encouraging transit use.

Mr. BORSKI. You refer to the need for an independent IVHS program evaluator, not DOT and not IVHS AMERICA. Besides the national laboratories, who would you see as a candidate for the program?

Mr. DITTMAR. Well, I think that the academic community could play a role here. We have university transportation centers that have been financed by DOT that could be involved. I think that if—I think that on an episodic basis, rather than an ongoing basis, GAO could serve a role if they were asked some questions that went more broadly beyond the role that they have been playing today, and I think that DOT could play a role if the resources were located perhaps in the Intermodal Office of the Secretary rather than in the Federal Highway Administration.

Mr. BORSKI. Unfortunately, because of the call to the Floor, I am going to stop here, but I do have a couple other questions that I

would like to submit to you and ask for your response in writing, if you would.

Mr. DITTMAR. We would be delighted.

Mr. BORSKI. Thank you very much. We appreciate your help as always. At this time I would like to place in the record the statements of Hon. Norman Y. Mineta and Hon. Walter R. Tucker III.

[Statements referred to follow:]

NORMAN Y. MINETA

CHAIR, COMMITTEE ON PUBLIC WORKS
AND TRANSPORTATION

SUBCOMMITTEE ON
INVESTIGATIONS AND OVERSIGHT

HEARING ON
INTELLIGENT VEHICLE-HIGHWAY SYSTEMS

JUNE 29, 1994

Today we have the first of two hearings focusing on an important component of our intermodal surface transportation program--the Intelligent Vehicle-Highway Systems program. When we created the IVHS program in the ISTEA legislation in 1991, we had in mind focusing our effort not just on building more highways and transit systems, but on using our existing systems more efficiently. IVHS is an important part of the "efficiency" in the Intermodal Surface Transportation Efficiency Act of 1991.

There are several issues we want to address in these two hearings. First, what direction has the Department of Transportation taken in implementing the program--what have been its priorities? Has it placed enough emphasis on each of the parts of our intermodal transportation system, including both highways and transit?

Second, what progress has DOT made in its key responsibility of setting standards and designing an architecture for IVHS so that users can travel from state to state and find compatible technologies in each state through which they travel? Clearly no one will want to invest in IVHS until they have some assurance that the technology they invest in will not be rendered obsolete by changing standards.

Third, what are the obstacles to further progress on IVHS? Is the institutional structure right? Do all the parties play an appropriate role? Is the funding adequate? In particular, will there be adequate funding to operate and maintain these systems after they are deployed?

IVHS, or, as some are calling it now, Intelligent Transportation Systems, has the potential to have a dramatic impact on the ease of using our surface transportation system. But to make sure the systems have the impact we want, we need to make sure that our priorities are in the areas with the highest payoff, that we move promptly to set standards that will allow users to invest in compatible systems, and that we provide adequate funding not only for R&D but for deployment, operations, and maintenance as well.

WALTER R TUCKER, III
37TH DISTRICT CALIFORNIA

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House Committee on Public Works and Transportation
Subcommittee on Investigations and Oversight

The Honorable Robert A. Borski, Chairman

June 29, 1994

Testimony on
Intelligent Vehicle Highway Systems

Submitted by

Congressman Walter R. Tucker, III
House Committee on Public Works and Transportation
on behalf of
The City of Anaheim, California

Mr. Chairman and Members, in this Committee's consideration of the value to America's cities and counties of Intelligent Vehicle Highway System technology, I am pleased to draw your attention to the IVHS research preparedness and infrastructure now in place at the City of Anaheim, California.

Earlier this year in connection with this Committee's highway reauthorization actions, I put a statement about the Anaheim Intelligent Vehicle Highway System Research and Development Project in the Congressional Record, and I now offer it for the record here. That statement encourages the Secretary to enable the proposed Anaheim IVHS project under Section 6055 of the 1991 Intermodal Surface Transportation Efficiency Act.

The project is an outgrowth of earlier Department of Transportation grants as authorized by the Congress and represents important potential highway safety and efficiency developments of national significance. The project will execute beneficial application of defense conversion resources in the unique highway transportation operational testing conditions in the Anaheim regional area.

The City of Anaheim is prepared to offer its unique municipal highway and interstate management, state of the art resources in an appropriate public/private testing and research program where Southern California's defense and space industries are seeking local governmental sponsorship of the new highway operating technologies as envisioned in the 1991 Intermodal Surface Transportation Efficiency Act.

Mr. BORSKI. This subcommittee hearing is adjourned.
[Whereupon, at 2:20 p.m., the subcommittee was adjourned.]
[Witnesses prepared statements follow:]

PREPARED STATEMENTS SUBMITTED BY WITNESSES

BEFORE THE

UNITED STATES HOUSE OF REPRESENTATIVES INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE OF THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

June 29, 1994
Washington, DC

Statement of the

AMERICAN TRUCKING ASSOCIATIONS, INC.

On

INTELLIGENT VEHICLE HIGHWAY SYSTEMS

Ray Chamberlain
Vice President, Freight Policy

SUMMARY OF STATEMENT

I. INTRODUCTION

A. ATA Represents the Trucking Industry

B. The Role of the Industry That Serves America

II. IVHS - WHAT IT MEANS FOR THE TRUCKING INDUSTRY

A. Motor Carriers Use What They Can

B. The Removal of Institutional Barriers - A Renewed Focus

III. IVHS POTENTIALS

A. Benefits to the Economy

B. Caution: Proceed With Care

C. Benefits to CVOs and the Movement of Freight

<u>Vehicle Location Systems</u>
<u>Traffic Information Services</u>
<u>Automated Roadside Safety Inspection</u>

IV. CONCLUSION

I. INTRODUCTION

A. ATA Represents the Trucking Industry

My name is Ray Chamberlain. I am Vice President of Freight Policy of the American Trucking Associations (ATA), the national trade association of the trucking industry. The ATA federation includes over 4,100 carriers, affiliated associations in every state, and 11 conferences. Together, we represent every type and class of motor carrier in the country. Combined with ATA's direct membership, we are a federation of over 40,000 member companies.

Thank you for scheduling these hearings on the implementation of intelligent transportation systems through the Intelligent Vehicle Highway Systems (IVHS) Program. We welcome this opportunity to testify before the Subcommittee concerning the views of the motor carrier industry on this vital matter. Because of its membership and the degree to which IVHS projects can potentially affect our business, ATA has a significant interest in the process of choosing which IVHS projects are implemented, how they are carried out, and in the broader conceptual goals behind the federal IVHS program in general.

B. The Role of the Industry That Serves America

At the outset, it may be useful to emphasize the size and diversity of the motor carrier industry in America. Trucking is the nation's largest transportation mode by many measures. It employs 7.8 million people throughout the economy directly and in jobs that relate to trucking activity. We have gross freight revenues equal to 5% of the Gross Domestic Product - some $300 billion in 1993. In the same year, trucks hauled over 77% of all manufactured goods and transported 43% of the total tonnage shipped by all modes - *2.9 billion tons of freight.* And demand continues to grow.

The freight was carried by the some 14.7 million commercial trucks registered in this country which belong to the over 245,000 motor carrier companies operating today. The vast majority of these companies (88%) qualify as small businesses under Small Business Administration definitions. So not only does trucking move America, in many ways we reflect America.

Very clearly then, technologies which stand to benefit the trucking industry are in turn likely to have a beneficial effect on the nation's economy.

II. IVHS - WHAT IT MEANS FOR THE TRUCKING INDUSTRY

There is a great deal of interest in the Intelligent Vehicle Highway Systems Program in both the public and private sectors throughout the United States. This is clearly because of the tremendous potential the program may hold for those involved in its evolution and implementation. IVHS interests Government because, through reduced congestion and improved safety, IVHS promises great advances in service to the driving public. Various sectors of private industry embrace IVHS as a welcome shift in strategic focus and as a bridge between defense-related technology and commercial application of that technology to solve transportation inefficiencies.

The notion of a more economical transportation system is very alluring. But what does all of this IVHS technology mean for the Motor Carrier?

A. Motor Carriers Use What They Can

IVHS does include some very useful innovations which have already been successfully adopted by some elements of the industry to increase productivity. Satellite tracking and two-way communication, for example, permits truckload carriers and some others to know where their vehicles are and permits load tracking and more efficient dispatching. On-board computers to monitor engines, vehicle navigation and routing systems which help identify least congested routes, are all IVHS applications that are currently enhancing the operations of many carriers.

Unfortunately, not every IVHS proposal affecting motor carriers is likely to be so beneficial. Quite the contrary in our view. Many are overblown schemes for excessive tax and credential enforcement, for the placement of equipment to monitor drivers inn every truck cab, or for the creation of massive and elaborate systems to track and weigh vehicles where ever they go. Some IVHS proposals would clearly advance a national weight-distance tax, which the trucking industry strongly opposes.[1]

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[1] Upon completion of a study with data that was 14 years old (GAO/RCED-94-181" Highway User Fees; June, 1994), the General Accounting Office determined that trucking was not paying its fair share of the costs it imposed on highways, and advocated a national weight-distance tax as a more equitable remedy to the situation. GAO indicated that IVHS technologies - weigh-in-motion (WIM) and automatic vehicle identification (AVI) - hold the potential to be employed to make the enforcement of such a tax possible.

However, according to this study, even on a state level, the

In all, few if any of these technologies are appropriate for every type of motor carrier. Those being employed are specific to where they make sense for the individual company. It is not hard to understand why this is so. The largely deregulated U.S. trucking industry is highly entrepreneurial and intensely competitive with an average profit margin of just *$1,760 per truck per year* (two percent!); costly technological frills are rejected, but each carrier will seek out and employ whatever technology will best enable it to fill its chosen niche in the overall transportation market.

B. The Removal of Institutional Barriers - A Renewed Focus

The biggest challenge to motor carrier productivity is not technological barriers. America has an abundance of high-tech capability ready to be applied to its transportation problems. In fact, there are many instances today, because of the shift within the defense industry, of technology in search of applications.

The problem stems from the other thing America has an abundance of: government regulatory structures. In other words, "Institutional Barriers."

According to the IVHS AMERICA 1993 Annual Report: "One of the paramount institutional obstacles to the timely development of a nationwide compatible IHVS infrastructure is the multiplicity of federal, state, and local government levels and authorities with jurisdiction over the elements of that infrastructure."

For example, within the San Francisco Bay Area 100 cities, nine county governments, greater than a dozen congestion management and sales tax authorities, a half dozen ports, several airports, two dozen public transit operators and several regional agencies as well as various state and federal offices share authority over the vast transportation network which serves the region's six million residents. Combined with a fragmented decision-making structure and budget constraints and you have a recipe for institutional gridlock.

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assessment and collection of such fees have resulted in an administrative quagmire. Applying debatable IVHS "solutions" across the entire country would result in a data-laden, bureaucratic morass with disastrous consequences for the goods movement industry, as well as for the economy. Furthermore, in the last 12 years, use taxes on heavy vehicles have been increased substantially to make up for this "inequity", challenging the necessity for a national tax. The purpose of IVHS is not simply to automate, for its own sake, a new and questionable federal tax program with no visible correlation to the valid goals of IVHS; improving the safety and productivity of the motor carrier.

It is very important when addressing institutional barriers to discern between barriers to improved productivity and safety versus simply those barriers to the complete implementation of a technology, just for technology's sake. Too often the phrase is interpreted to mean merely the removal of barriers to the latter. IVHS projects, where applicable, must be applied in conjunction with other steps, namely the removal of government barriers to productivity and safety, the foremost goals of IVHS, if they are ever to be fully effective.

There is no point in upgrading a technology in a government program when that program is poorly conceived or shouldn't be undertaken at all. ATA feels that this aspect of IVHS development - the non-technological aspect - may well be the most beneficial of all to the motor carrier industry. We encourage the FHWA to devote a great deal of attention to this aspect if it wants to promote the use of IVHS technologies and bring to the industry their full potential for enhanced productivity and safety. The converse, the unconsidered application of high technology to regulatory programs that are fundamentally unproductive, would just result in automated institutional barriers, a potential disaster for this nation's freight transportation system.

III. IVHS POTENTIALS

A. Benefits to the Economy

Intelligent Vehicle Highway System technologies are information and travel management tools which can serve to fuse and connect all modes of transportation into one cohesive, more efficient system. This seamless system of information and transportation is an alliance that can enable the country to reach key national transportation goals - enhanced safety, less congestion, a cleaner environment, and greater productivity and energy efficiency. This last capability is particularly meaningful.

The American transportation sector is huge - 17% of our gross domestic product is spent on transportation services - about a trillion dollars. Just a 1% gain in efficiency would result in a savings of *$100 billion over ten years.*

Not only does IVHS stand to save America money through these increases in productivity and safety; it holds the possibility of creating a new, immensely promising American transportation industry with global opportunities.

It is clear that IVHS holds much potential for use in the every day operations of a trucking company. Several of these benefits are described on the pages below. Moreover, there are sure to be even more benefits, not yet visible, existing on the horizon. What are visible, however, are some caveats which have to be addressed before the full embrace of IVHS technology by the trucking community is possible.

B. Caution: Proceed With Care

ATA has established three major goals or conditions which are critical for any IVHS projects. Such projects must be **voluntary, cost-effective,** and **interoperable.**

* First, the project must be VOLUNTARY on the part of motor carriers. That is, projects must involve no government mandates for equipment or operations. The industry will not embrace an application that turns out to be a mandate, because the mandate may lock in a technology that would not have been chosen by a free marketplace.

* Second, the project must be COST-EFFECTIVE for motor carriers. We do not want "data-junkies" collecting data that isn't needed. This goes for hardware and services. It should be measured both against current procedures and also against other procedures that might be implemented with a lesser reliance on IVHS technologies. This seems obvious, but it appears just as obvious that some IVHS proposals have failed to undergo the cost-benefit analysis automatically provided by the free market.

* Third, the project must employ technology that is INTEROPERABLE, in other words, not incompatible with that employed in other IVHS projects; and it should not create needless and expensive proliferation of gadgetry. Carriers should not have to acquire a large assortment of devices to take advantage of what are supposed to be helpful innovations.

Meeting the above criteria depends on another concern related not to specific projects, but to the foundation of IVHS in general. In order for IVHS to reach its full potential, CVO input in the underlying architecture and standards must be insured. In this matter, public/private partnerships are vital.

The public side of the arrangement, ie. the various levels of government, functions to manage and coordinate activities. The private industry aspect of this partnership ascertains needs, helps to identify regulatory or technological barriers, and selects the most cost-effective strategy available, technology-based or not, to correct the problem.

The term "Private Industry" means more than just the producers and purveyors of IVHS technology. Without the complete and valued involvement of the end users of such technologies, particularly the freight transportation community, a supermarket of IVHS merchandise that is supplier driven rather than one responsive to the real productivity and safety needs of our industry is likely to develop.

C. Benefits to CVOs and the Movement of Freight

There are many good ideas in IVHS which carriers are testing, or are already using because they see either direct, present economic benefits or very substantial potential benefits for their particular kind of operations. Three principal areas of application are; vehicle location systems, traffic information services, and automated roadside safety inspection.

Vehicle Location Systems

Vehicle Location Systems can help the motor carrier improve fleet efficiency and safety. These systems, when designed to operate with a carrier's existing on-board communications equipment, use an in-vehicle GPS (global positioning system) unit to transmit data on time, position, velocity, and bearing of the vehicle to the dispatch center. These systems work in league with two-way communication systems using satellite, cellular, or radio frequencies to communicate data over varying distances. The data transmitted may relate to an order from a customer, information on the vehicle's components, or the status of the driver. Using this data, the dispatcher can better predict the estimated time of arrival or departure of critical shipments, adding value to and lowering the cost of the service provided. This is especially important to just-in-time manufacturing processes.

Traffic Information Services

If knowing the location of a shipment is critical, knowing the potential traffic delays to it can be even more so. In league with a Vehicle Location Service, a Traffic Information Service's greatest value is that it can help the dispatcher or driver select the quickest route by simply allowing him to plan the trip according to current roadway, traffic and control conditions. Information is collected, pooled, and made available to the driver on road construction advisories, traffic incidents, special events, load limits, and more. This would enable the dispatcher, or driver, to plan trips intelligently, rather than relying on hunches and appeals to luck.

Automated Roadside Safety Inspection

This IVHS application is not one used directly by the motor carrier to improve his fleet productivity, but is a mechanism with the potential to add value to a government safety inspection service. It gives inspection personnel instruments to expedite compliance checks at weigh stations where data on safety, weight, and driver credentials would be electronically collected. An Automated Roadside Safety Inspection service would use the data collected and, combined with other IVHS technology, allow for more selective and rapid inspections. This saves the state money as fewer man hours are needed to perform the same service, and could save the trucker money by potentially reducing the long queues at weigh stations.

The expanded testing and use of these technologies represent a clear interest on the part of the CVO community, in the potential of IVHS to enhance the productivity and safety of motor carrier operations.

IV. CONCLUSION

The central issue facing the CVO community in the deployment of IVHS for use by the industry is focusing the application of technology on achieving the paramount goals of improved carrier productivity and safety. However, technology alone should not be viewed as the panacea. Where IVHS is not applicable or relevant to the improvement of productivity or safety, it is not relevant at all. Where IVHS services are not voluntary, cost-effective, or compatible, they are not services at all.

Furthermore, it is not the role of the Federal Government to make mandatory markets or pick winners and losers in the IVHS market place. That is the role of the users to decide.

A highly entrepreneurial and competitive environment is the most practical milieu for judging the best technologies for CVOs to apply because the market place holds up productivity gains as the crown accomplishment.

Advancing productivity and safety - these together have to be the underpinnings of any successful IVHS program, and of the technological infrastructure essential to improving the overall efficiency of our nation's transportation system.

Thank you for the opportunity to testify.

I V H S   A M E R I C A

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TESTIMONY OF

LAWRENCE D. DAHMS
EXECUTIVE DIRECTOR
METROPOLITAN TRANSPORTATION COMMISSION
OF OAKLAND, CALIFORNIA

AND
CHAIRMAN OF THE BOARD,
THE INTELLIGENT VEHICLE-HIGHWAY
SOCIETY OF AMERICA OR
IVHS AMERICA

BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS
AND OVERSIGHT
COMMITTEE ON PUBLIC WORKS

U.S. HOUSE OF REPRESENTATIVES
REGARDING THE
INTELLIGENT VEHICLE-HIGHWAY SYSTEMS PROGRAM

JUNE 29, 1994

EXECUTIVE SUMMARY

Hearing on the Intelligent Vehicle-Highway Systems Program
Subcommittee on Investigations and Oversight
Committee on Public Works
U.S. House of Representatives
June 29, 1994

Witnesses
Lawrence D. Dahms
Executive Director
Metropolitan Transportation Commission
Oakland, California, and
Chairman of the Board
Intelligent Vehicle-Highway Society of America or IVHS AMERICA

accompanied by: Dr. James Costantino
Executive Director
IVHS AMERICA

On behalf of IVHS AMERICA, Lawrence D. Dahms testified before the subcommittee and was accompanied by Dr. James Costantino. The written statement addresses a series of questions about IVHS AMERICA's role in the IVHS program. The highlights of the written statement are listed below.

I. IVHS AMERICA's Role in the IVHS Program

- IVHS AMERICA's mission is to accelerate the development and deployment of advanced technology for our nation's surface transportation system. IVHS AMERICA works to build consensus on IVHS issues and encourages the development of public-private partnerships, like the I-95 Corridor Coalition and others.

- IVHS AMERICA serves as a utilized Federal Advisory Committee to the U.S. Department of Transportation by providing program recommendations.

II. TRAVINFO

- Mr. Dahms provided information on his efforts for the Metropolitan Transportation Commission of Oakland, California and in the TRAVINFO project that addresses travel and traffic management in the San Francisco Bay area. TRAVINFO will implement a comprehensive, region-wide traveler information system, capable of supplying a broad array of devices and users with transportation information both before and during trips.

III. IVHS Planning Efforts

- IVHS AMERICA is jointly involved with the U.S. DOT in the efforts to create a National IVHS Program Plan by December 1994. The plan provides 28 "user services" targeted to meet the needs of the user which will provide numerous benefits from personalized public transit, driver and personal security to vehicle fleet management and more. Significant public outreach and consensus building is being conducted.

- IVHS AMERICA is working jointly with the U.S. DOT to develop a National IVHS system architecture slated for completion in 1996. This program will allow stakeholders to adopt the elements of IVHS at their own pace, enable the elements to be supplied by multiple vendors and serve as the foundation for standards. A major public outreach and consensus building effort is occurring.

- These planning efforts are being coordinated to minimize conflict between the IVHS architecture and IVHS AMERICA's efforts on standards identification and development.

IV. Advanced Public Transportation Systems

- IVHS aims to make public transit more "user friendly" to increase ridership. This can be accomplished in three ways: (1) internally to transit agencies by applying computer technology; (2) externally to transit agencies by focusing on the customer by providing "real-time" information before and during the trip; (3) in an intermodal sense by providing connections to other modes and facilitating payment for travel through "smart cards."

- More funding is needed for IVHS applications to public transit. IVHS AMERICA is working to provide outreach and education to state and local transit officials.

- APTS provides alternatives to single-occupancy vehicle travel. One such program is ridesharing. The diversion of one of every five solo drivers would save the United States $30 billion in congestion each year.

V. Advanced Traffic Management Systems

- More funding is needed for deployment of Advanced Traffic Management Systems. More importantly, area-wide coalitions must be built; responsibility must be shared; there must be a commitment to continue the cooperative and efficient operation of many different highway and transportation systems in ATMS.

VI. Electronic Toll and Traffic Management Systems

- IVHS AMERICA is in the process of finalizing a document that identifies performance-oriented technical requirements for use in the Electronic Toll and Traffic Management industry. Upon completion, the document will be delivered to a standards-making body. Once a standard, it will provide the needed national uniformity which will encourage manufacturers to develop "next generation" technologies and assure states that the technologies would be operable across the nation.

VII. Commercial Vehicle Operations

- Funding for Commercial Vehicle Operations must be set aside for states that need to modernize their CVO information processing systems. IVHS AMERICA is taking the lead to develop standards to achieve a nationwide interoperability system for electronic clearance and the handling of administrative data associated with crossing boundaries.

VIII. International IVHS Comparative Study

- Internationally, the United States IVHS program leads by several important measures, (e.g. overall organization and top-down planning, current investment in R & D and operational tests, and in deployment of certain applications such as electronic toll collection, commercial vehicle operations) while Europe and Japan remain ahead in other areas (e.g., Europe, arguably, in broadbased R&D and Japan in deployment of Advanced Traffic Management Systems and Advanced Traffic Information Systems), reported an international comparative study on IVHS commissioned by IVHS AMERICA.

IX. Constraints and Challenges to IVHS Deployment

- The primary challenges to deployment of IVHS are the need to: enhance deployment funding; develop uniform national standards; and increase the support and involvement of local officials in the IVHS program.

X. Funding for IVHS

- Continued support from the U.S. Congress, and all levels of government, is needed to ensure success of the IVHS program. Over the next 20 years, IVHS will become a $209 billion industry. The private sector, coupled with consumer investment, will support some 80 percent of the program. The remaining 20 percent will come from government at all levels. But to reach that point, the IVHS program needs to continue receiving federal funding for infrastructure deployment.

- Most importantly, investment in IVHS will save money in the long term. Traffic congestion costs our economy more than $100 billion a year in lost productivity. Traffic accidents, more than half of which are caused by congestion, cost us another $70 billion annually. Traffic congestion also has an enormous effect on the environment. IVHS will enhance safety, reduce congestion and improve mobility, enhance economic productivity, increase energy efficiency and environmental quality.

TESTIMONY OF
LAWRENCE D. DAHMS
EXECUTIVE DIRECTOR
METROPOLITAN TRANSPORTATION COMMISSION
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INTELLIGENT VEHICLE-HIGHWAY SYSTEMS PROGRAM
JUNE 29, 1994

Mr. Chairman, members of the subcommittee, I am Larry Dahms, Executive Director of the Metropolitan Transportation Commission in Oakland, California and Chairman of the Board of the Intelligent Vehicle-Highway Society of America. It is a pleasure to be here to testify on behalf of IVHS AMERICA. This morning I am accompanied by Dr. James Costantino, Executive Director of IVHS AMERICA. The purpose of this testimony is to provide an update of the IVHS program based on questions you submitted to us prior to this hearing.

A public-private partnership, IVHS AMERICA has over 500 participating member organizations from the private sector, the public sector, associations, academia, and members of the international IVHS community. We also actively recruited public interest groups and a number of them participate with us.

Mr. Chairman, I understand that the I-95 Corridor Coalition, a highly successful public-private partnership is testifying today. I have the utmost respect for their work. They are one of the most focused and dedicated groups at IVHS AMERICA. They deserve full congressional support for their funding request of $12.5 million.

IVHS AMERICA's role in the Development and Implementation of Intelligent Vehicle-Highway Systems

Our mission is to accelerate the development and deployment of advanced technology for our nation's surface transportation system. We operate as a non-profit scientific and educational institution. IVHS AMERICA's role in the IVHS program is to bring interested parties to the table, to coordinate their efforts and to build consensus. We provide this information to the U.S. Department of Transportation as a utilized Federal Advisory Committee.

We wish to compliment the U.S. DOT for its leadership role in helping to address the issues in the IVHS public/private partnership. As the lead public-private partnership, our goal is also that our meetings will encourage our members to foster public-private partnerships for IVHS development on all levels.

Intelligent Vehicle-Highway Systems -- IVHS

IVHS uses advanced computer, electronic, and communications technologies to address the problems of the entire surface transportation system. Many of these technologies have in the past advanced other modes of transportation, such as aviation and rail. Applying IVHS technologies to the surface transportation system will reduce congestion, increase safety, enhance economic productivity, improve energy efficiency and environmental quality, and create new markets. Our own plans show that deployment of IVHS can, by the year 2011, reduce traffic congestion by up to 20% and reduce traffic fatalities by up to 8%.

TRAVINFO

I am involved in TRAVINFO, an IVHS operational test that addresses travel and traffic management in the San Francisco Bay area. CALTRANS, the Bay Area Ad Hoc IVHS Committee and the Federal Highway Administration are working together. The TRAVINFO project will implement a comprehensive, region-wide traveler information system, capable of supplying a broad array of devices and users with transportation information both before and during trips. TRAVINFO includes the development and operation of a multi-modal transportation information center that will integrate transportation information from a wide variety of sources and make the information available to the general public, public agencies and commercial vendors.

TRAVINFO will pursue an "open-access" architecture for all aspects of the system to provide for future growth and facilitate the transfer of technology. The architecture design contract has been awarded. The evaluation plan has been finalized. The management board is meeting regularly to discuss and resolve issues. TRAVINFO, which began in 1993 and will run approximately through 1996, is an excellent example of a successful IVHS project.

The information gathered from these projects can be directly integrated into the broader-based efforts to provide a framework for IVHS deployment, namely the efforts to draft a National IVHS Program Plan and develop an IVHS system architecture. We are coordinating these planning efforts to minimize conflict between the IVHS architecture development and our efforts on standards identification and development. These two programs are described below.

IVHS System Architecture Program

We are working with the U.S. DOT to develop an "open" IVHS system architecture, slated for completion in 1996. The goals of the program are to ensure nationwide compatibility through development of a technically sound architecture, to encourage innovation, and to develop a wide base of support for the selected architecture.

An architecture will allow stakeholders to adopt the elements of IVHS in the manner and timeframe of their choosing, enable these elements to be supplied by multiple vendors, serve as the foundation for standards that can reduce duplication of effort by the stakeholders, speed the introduction of IVHS products and services and reduce the risk for the private sector developing these products and services.

IVHS AMERICA recommended a system architecture development methodology to U.S. DOT which uses the efforts of multi-disciplinary public/private/academic teams. The U.S. DOT initiated the National IVHS Architecture Development Program which tracks with IVHS AMERICA's recommendations.

The U.S. DOT has selected four consortia led by Hughes Aircraft, IBM-Loral, Rockwell International, and Westinghouse Electric to each develop an alternative IVHS architecture. Phase I which entails architecture definition, lasts 15 months and ends in December 1994. The consortia with the most promising architecture, based both on technical soundness and stakeholder preferences, will continue into Phase II. At that time, architecture refinement and evaluation will occur from December 1994 to July 1996. As presently planned, at the conclusion of Phase II in mid-1996, a national IVHS system architecture will emerge.

An extensive effort has been underway to involve the IVHS stakeholders involved in IVHS who will use, design, build, operate, maintain, and be impacted by these systems. These stakeholders have helped design a consensus building process which entails coordinating the IVHS Architecture Consensus Task Force, which consists of 40 major national organizations interested in the IVHS program. We have also conducted a series of regional architecture forums for the public in the 10 U.S. DOT regions. Our efforts also include keeping the technical committees and regional chapters of IVHS AMERICA informed and involved.

The National IVHS Program Plan.

We are also working with DOT on the *National IVHS Program Plan* which will serve as a tactical plan to assure coordination and integration of IVHS activities among all of the participants in the program. *The Plan* represents a collaborative effort toward deployment. It collects the expertise and information compiled by elements of the members of IVHS AMERICA, the U.S. DOT, and public and private entities that offered comments to IVHS AMERICA and the public docket. It sets out the categories of services that IVHS applications can provide, how those categories interrelate, what the technologies are likely to involve and how they might evolve.

The Plan identifies 28 "user services," such as pre-trip travel information, route guidance, ride matching and reservation, commercial vehicle electronic clearance, vision enhancements for crash avoidance, and traffic control.

In June, IVHS AMERICA and the U.S. DOT are conducted a series of regional forums based in five metropolitan areas to solicit public comment on the second draft. The final edition of *the Plan* will be completed in December 1994.

As IVHS evolves, the U.S. DOT, IVHS AMERICA, state and local governments, the private sector and the public, will continue to assess changes in government policy, technology, market conditions, and program successes and failures as part of the national programming process. As now envisioned, formal *IVHS Program Plan* updates will be prepared on an annual basis and reported to Congress.

Standards Development Process

Standards play a critical role in the development of a national IVHS system. The U.S. DOT has contracted much of its standards-making mandate to IVHS AMERICA. Although not a standards-developing organization, IVHS AMERICA has taken the lead in building the consensus which leads to the production of required standards.

We are working with the various standards-developing organizations (SDOs) to ensure that their standards support the overall IVHS program and do not duplicate each other's work. SDO's active in the IVHS standards program include the Society of Automotive Engineers, the Institute of Electrical and Electronics Engineers, the American Society for Testing and Materials, the National Electrical Manufacturers Association, the American Association of State Highway Transportation Officials, the Telecommunications Industry Association, the Institute of Transportation Engineers, and the American National Standards Institute.

Current priorities include standards for automatic vehicle identification, map databases, systems interfaces, human factors, and communication protocols. The system architecture development program will also generate the need for many new standards. Information gathered from the domestic architecture and standards programs will be integrated into the International Standards Organization efforts.

Resources and Strategies Being Devoted to Developing and Implementing IVHS Technology that Will Make Public Transportation a More Attractive Option for Travelers, so as to Reduce Congestion and Attain Air Quality Goals

Advanced Public Transportation Systems (APTS)

Advanced Public Transportation Systems (APTS) use advanced electronic technologies in the operation of high occupancy, shared-ride vehicles, including conventional buses, rail vehicles,

and the entire range of para-transit vehicles. The IVHS technologies of communications, navigation, and advanced information systems are being developed for Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS). They hold immense potential for improving mass transportation services and will be used to inform travelers of the alternative schedules and costs that are available for any given trip, including the most advantageous routing.

APTS can also automatically handle trip fees. APTS will keep the traveler informed, in real time, of any system changes that occur and will respond to changes in the traveler's plans. APTS technologies will help vehicle system administrators manage a safe and efficient fleet. It would also plan services to meet a broad range of consumer needs and will allow the community to manage its roadways with special accommodations for high occupancy vehicles. They will, in essence, enable transit authorities to provide a more flexible, cost effective, user-friendly service to their customers. Some specific APTS features include the following:

- Mass transit and ride-sharing information that is thorough, accurate, up-to-date, readily accessible, easily understood, convenient, and tailored to users' needs.

- Ride-matching information that allows the flexibility to change arrangements on short notice, even during travel.

- Mass transit and ride-share services that eliminate the inconveniences of exact change cash requirements and complex reservation and payment methods.

- Traffic control measures that provide preferential treatment, such as traffic signal timing and separate lanes, for high occupancy vehicles (HOV's), thus reducing delays for mass transit and shared-ride vehicles operating in congested areas.

There are many advanced technologies already in use in APTS applications. Many more are either available or are undergoing near-term development. An important component of the program is identification of the technologies and determination of their capabilities. To increase the knowledge base assessments of the technologies must occur. Currently, technology assessment is proceeding in three areas: vehicle location, communications, and smart cards. For vehicle location, operational tests and assessments will be performed on promising technologies, for example the application of Global Positioning Systems to transit operations. Communications systems, which are crucial for the operation of APTS, include options for voice and data communications such as cellular radio, optical and ultrasonic methods and other technologies.

Smart cards are plastic cards the size of a credit card that contains a microchip with a programmable memory. In a mass transit application, the microchip would contain information on the ownership of the card and the monetary value or account to be debited. The smart card is already in use in some European cities.

APTS Implementation Strategies

The goal of APTS is to make transit systems "user friendly" to travelers to increase their ridership. The technology will have to be implemented on three levels:

- In a manner internal to the transit agency by applying computer technology to transit systems. One example, the user service, "public transportation management," automates the operations, planning and management functions of public transit systems. It supplies real-time computer analysis of vehicles and facilities to improve transit operations and maintenance. The analysis identifies deviations from the schedule and offers potential solutions to dispatchers and drivers. This service will help maintain transportation schedules and assure transfer connections from vehicle to vehicle and between modes and can be coupled with traffic control services to facilitate quick response to service delays. Information regarding passenger loading, vehicle running times, accumulated miles and hours and vehicle maintenance will help improve service and provide managers with a wealth of information on which to base decisions. Service schedulers will have timely data to use in adjusting trips. Personnel management will be enhanced with the automatic recording and verifying of performed driving and maintenance tasks.

- In a manner external to the transit agency by focusing on the consumer. This entails the use of "traveler information" which provides information to travelers regarding public transportation. Real-time, accurate transit service information will be available, at home, at transit stations and bus stops, and on board the vehicle to assist travelers in making informed decisions. The goal of this information is to influence mode choice before travelers leave their homes or before a travel decision is made.

  Personalized public transit service offers flexibly routed transit vehicles which offer more convenient, and often more cost effective, service to customers where traditional, fixed route operation cannot be economically justified. Small public or privately operated vehicles provide on-demand routing to pick up passengers who have requested service and deliver them to their destinations.

- In a manner promoting intermodalism. Ways would be determined to connect transit systems with other modes of transportation. Travelers would be able to use smart cards for payment on a variety of transportation modes, from transit fares to parking tolls.

A host of operational tests are being conducted on APTS around the country. As experience is gained, we expect that a database of user requirements will be developed. This data will be used in the development of formal specifications for equipment. The specifications will focus on function and performance rather than how to design it -- allowing room for innovation on the part of manufacturers.

Two examples of operational tests, the Smart Traveler project in Seattle, Washington, and the Smart Bus in Ann Arbor, Michigan, show how APTS features will benefit transit.

Smart Traveler. The Bellevue Smart Traveler project in metropolitan Seattle, Washington, examines ways in which mobile communications, such as cellular phones, and information kiosks can be used to make ridesharing (carpooling and vanpooling) more attractive. A Traveler Information System is also being evaluated. A set of information-based services for ridematching was developed in Phase I of the project in cooperation with the mobile telecommunications industry in an effort to increase the use of high occupancy vehicle (HOV) facilities.

Smart Bus. The Ann Arbor Smart Bus operational test project entailed studying an on-board bus communication and navigation system, a central control system, and a "Smart Card" fare collection system. The on-board system monitors actual performance in regard to route, location, speed and status of mechanical systems. It will allow control of on-board electronics, such as the fare collection system.

The on-board system will also enable buses to communicate with the central control system which will integrate the data from the bus fleet for coordinated supervision, and will also provide real-time transit information to the public. The "Smart Card" fare system will provide a dual farecard/parking pass to encourage auto drivers to ride transit by providing them an easy cost-saving method for fare payment.

IVHS Funding Must Be Targeted To Transit

To move toward deployment of projects like the Smart Traveler and the Smart Bus, more IVHS funding will have to be dedicated to public transit. In addition, transit operators will need to be kept informed of and educated about the benefits of IVHS.

IVHS AMERICA is working to provide outreach and education to state and local transit officials. We are working to build diverse coalitions to discuss the capabilities of these technologies, identify user requirements and set operational standards. Last year, for the first time, our APTS Committee engaged in a public-private endeavor which created a standard to share common information between the electronics on a vehicle.

How APTS Can Help Attain Air Quality Goals

One of the goals of the APTS program is to comply with the new air quality requirements It is predicted that the features of APTS will reduce congestion, and therefore, produce environmental benefits.

For example, ridesharing will provide an attractive alternative to single occupant automobile travel. It will provide enhanced alternatives for special population groups, such as the elderly or the handicapped. It has been estimated that the diversion of just one out of every five solo drivers would save the U.S. $30 billion in congestion each year.

The U.S. DOT is conducting data collection and analysis to investigate and model the emissions profile of vehicles in actual traffic operation. However, the National IVHS Program Plan recommends additional research on the relationship of travel and emissions.

Efforts to Provide for the Special Needs of Metropolitan Areas to Deploy and Maintain Advanced Traffic Management Systems

Advanced Traffic Management Systems (ATMS) employ innovative technologies and integrate new and existing traffic management and control systems to be responsive to dynamic traffic conditions while servicing all modes of transportation. Key features of ATMS are subsystem integration and real-time control adjustments that account for traffic fluctuations.

The IVHS AMERICA Advanced Traffic Management Systems (ATMS) Committee has been studying many aspects of the program including funding, deployment, meeting the special needs of metropolitan areas, encouraging the participation of state and local governments.

A subset of that committee, the Travel Demand Management Task Force, is charged with coordinating the identification of travel demand and telecommuting technologies and programs within all the committees of IVHS AMERICA and ongoing programs sponsored by the FHWA and the Federal Transit Administration.

Funding Sources for ATMS

A variety of funding sources available for ATMS are described in the Intermodal Surface Transportation and Efficiency Act (ISTEA). The specific sections of the Act are detailed in Appendix I of this testimony. However, deployment of ATMS will require more funding.

Private revenue sources may involve joint ventures or partnerships between private corporations and public agencies in the development and deployment of IVHS technologies. There may also be private (or quasi-public) transportation authorities that can benefit from ATMS and contribute to implementation and operation costs. Other private-sector revenue sources might involve fees charged to various organizations for real-time information.

Operating agencies may engage in cooperative ventures with private industry or by seeking out user fees. Marketing efforts will also play an important role in the implementation and continued operations of ATMS. Educating the public on operations and potential system benefits should result in improved compliance and support for continued public funding for ATMS.

Need For Area-Wide Coalitions

Imperative to the ATMS program, nearly more so than funding, is the building of area-wide coalitions. It requires sharing responsibility across jurisdictional lines within a metropolitan area. The program also demands a commitment to continue the cooperative and efficient operation of many different highway and transportation systems.

Planning and preliminary design studies in metropolitan areas and urban corridors already underway nationwide are key to implementation. Long-term plans should include a methodology to upgrade, improve, and/or update existing and proposed IVHS infrastructure.

Plans to Coordinate the Deployment of IVHS Technology and Services for Electronic Toll Collection.

The Electronic Toll and Traffic Management (ETTM) industry is characterized by several different technologies, each proprietary and not interoperable with the others. Some regional initiatives have emerged to provide interoperability among multiple agencies or jurisdictions that share overlapping customer markets. However, these new technologies have been deployed so far on a fairly limited geographic basis.

Thus, IVHS AMERICA coordinated a broad group of users to collectively define performance-oriented technical requirements to encourage and support the development of next generation technologies by the manufacturing community to provide for future national interoperability.

In January 1994, a Special Group of the IVHS AMERICA Committee on Standards and Protocols released a document titled, ***Electronic Toll and Traffic Management (ETTM) User Requirements for Future National Interoperability (Draft Version 1.0).*** In April 1994, ***Draft Version 2.0*** was released. To date, the document has been released for comment to the ETTM industry-at-large -- State DOT's, toll agencies, vendors, and other interested parties. Appropriate commentary has been, and will continue to be, incorporated into it.

In its final form, the ETTM user requirements document will be delivered to one or more standards developing organizations. This phased-approach process should ultimately produce standards to which future ETTM systems can be procured by the user community and which will help to ensure future ETTM interoperability and ultimately deployment.

Commercial Vehicle Operations

Commercial Vehicle Operations (CVO) apply various IVHS technologies to improve the safety and efficiency of commercial vehicle and fleet operations. CVO includes trucks, delivery vans, buses, and emergency vehicles. CVO systems increase safety, expedite deliveries, improve operational efficiency, improve incident response, and decrease operational costs.

Implementation of the CVO program is essential because the cost of regulation is substantial to both government and the trucking industry. States spend $5 billion annually to license vehicles, collect fuel taxes, and issue permits. Carriers spend another $2 billion annually for the paperwork associated with those tasks.

States spend more than $100 million annually for truck weight enforcement alone. The interstate motor carrier industry spends millions of hours annually waiting for weight and safety inspections, toll collection, and port-of-entry checks.

A key CVO goal is the creation of "transparent" or unimpeded commercial traffic, state and international borders. That will, in part, be achieved by automating the collection of information regarding weight, credentials and taxes required by government agencies. Benefits are further enhanced as the information is shared by several states. By expanding the information collected, carriers will also gain access to information essential for managing their fleets.

Considerations For CVO

In advancing CVO, several considerations should be made. Stakeholders, including major motor-carrier fleets, must be active in the development of these IVHS technologies, including testing, operations and product development. This would ensure that the technologies are useable and that they upgrade the current operational mechanisms. Institutional issues regarding interagency coordination, public/private cooperation, and safeguarding of privacy and proprietary data must be addressed.

Funding Needs for CVO

Funding must be set aside for states to modernize their CVO information processing systems. This will help achieve interoperability. IVHS AMERICA is taking the lead to develop standards to achieve a nationwide interoperability system for electronic clearance and the handling of the administrative data associated with crossing boundaries.

CVO Systems Currently Being Tested

There are numerous CVO operational tests. For purposes of illustration, we will discuss the HELP project. HELP (Heavy Vehicle Electronic License Plate Program) is a multistate, multi-national research effort to design and test an integrated heavy vehicle monitoring system that uses Automatic Vehicle Identification (AVI), Automatic Vehicle Classification (AVC), and Weigh-In-Motion (WIM) technology. The test phase of HELP is known as the Crescent Project.

The Crescent Project includes approximately 40 equipped sites ranging from British Columbia southward along I-5 to California and then eastward along I-10 to Texas, branching into I-20. Data gathered from the WIM, AVI and AVC is processed by a central computer, and then used by the state governments for credential checking, weight enforcement, and planning information and by the motor carrier industry for fleet management purposes.

HELP's ultimate goal is to have a system in which a legal truck can drive through the entire network without having to stop at weigh stations or ports-of-entry. AVI, WIM and AVC equipment has been installed at sites in Washington, Oregon, California, Texas, New Mexico and Arizona as part of Phase "IB" and Phase II efforts. Approximately 2,000 trucks were equipped with transponders during the test period.

The performance of the integrated system and the benefits to the state agencies and the motor carriers were evaluated. Evaluation reports are currently being finalized. Operation of the Crescent System and other technical activities of HELP have been turned over to a new private organization known as HELP, Inc.

How the United States IVHS Program Compares With Other Nations in Deployment

In response to questions asked by a member of the House Appropriations Subcommittee on Transportation, IVHS AMERICA commissioned a team of international engineers and transportation experts familiar with IVHS to conduct a comparative study on IVHS in Japan, Europe and the United States. Titled, "A Comparison of IVHS Progress in the United States, Japan and Europe Through 1993," the study found that all three have made great progress in IVHS development, although the focus varies from region to region:

- In Japan, the main focus has been on deployment of advanced traffic management systems and the development and marketing of automobile navigation systems as a platform for in-vehicle information.

- The European focus has been on exploration and evaluation of numerous alternatives for a wide variety of IVHS services with the view that a common architecture would evolve in due course.

- The United States has focused on planning, organization, evaluation, and a top-down systems engineering approach to developing a national IVHS architecture while simultaneously carrying out research and field trials.

Europe and Japan initiated IVHS-type research projects in the early 1970's and continued to build on them steadily. Waning government support in the United States at that time and through the 1970s and 1980s left the United States IVHS pursuits dormant. Significant government policy and funding support in the early 1990s allowed the U.S. IVHS program to expand rapidly, both organizationally and in research and development.

Over the past 20 years, Japan has consistently invested in their IVHS infrastructure, especially in the areas of traffic management and information systems. In 1981, Japanese automobile manufacturers introduced the first automobile navigation systems available as factory options. In the late 1980s, their research concentrated on intelligent driving systems and automatic vehicle control for 20 to 30 years in the future. In the early 1990s, they developed a new type of infrared vehicle detector that also serves as a high-bandwidth two-way communications beacon for supplying traffic information to and receiving link travel times from equipped vehicles.

In sum, the United States leads by several important measures (e.g. overall organization and top-down planning, current investment in R& D and operational tests, and in deployment of certain applications such as electronic toll collection, commercial vehicle operations, etc.) while Europe and Japan remain ahead in other areas (e.g., Europe, arguably, in broadbased R & D and Japan in ATMS and ATIS deployment.)

Funding Levels

The comparative study stated that although government funding plays a critical role in each region, there are other factors that strongly influence differences in IVHS progress. The clarity and consistency of policy support and the effectiveness of organizational arrangements are the most important factors, reported the study. Funding levels for IVHS are often difficult to identify. In a very general sense, perhaps $1.5 billion per year is currently being invested worldwide in IVHS, the study reported.

The European Community. In Europe, the central source of public sector funding for IVHS is the Commission of the European Communities, which manages and finances DRIVE as part of its broader Framework Program. The EC provided a total of 200 million European Currency Units (ECU) (about $230 million) for the original DRIVE program (1988-1991) and for DRIVE II (1991-1994), reported the comparative study. Private industry is the main source of funding for IVHS research carried out under PROMETHEUS (PROgraMme for a European Traffic system with Highest Efficiency and Unprecedented Safety).

Japan. In Japan, after spending an equivalent of $180 million for underlying research during the 1970s, the government's principal funding for IVHS has been for infrastructure deployment. Japanese industry has been motivated to largely pay its own way in developing IVHS products.

United States. Funding for IVHS research went from very little in Fiscal Year 1989 to about $214 million in Fiscal Year 1994. ISTEA, which mandated the IVHS program, authorized $659 million over a six-year period for IVHS. The Clinton Administration's Fiscal Year 1995 budget proposed $289.31 million for IVHS, a 35 percent increase from the Fiscal Year 1994 level. In mid-June, the U.S. House of Representatives passed the Department of Transportation and Related Agencies Appropriations Bill which provided $119.8 million for the Federal Highway Administration's IVHS contracts, research and technology programs. The bill is being reviewed by the U.S. Senate.

In the United States, although most of the federal funds are primarily for research and operational testing, approximately $7 million is granted annually under an Early Deployment Program to state and local governments and Metropolitan Planning Organizations to assist with feasibility studies and development of multi-year deployment plans for IVHS services. Such grants, which must be matched by at least 20 percent funding from nonfederal sources, were made to 36 metropolitan areas through fiscal year 1993, reported the comparative study.

However, in general IVHS funds are dedicated to research and testing and not deployment. More funding must be directed specifically for deployment if the United States is to remain competitive in the international IVHS marketplace.

First Annual World Congress

IVHS AMERICA believes in building relationships with the international IVHS community. In the long run, this will provide export markets for American manufacturers and facilitate technical information exchange. This fall, IVHS AMERICA, in cooperation with Europe, Canada, Japan and Australia, is organizing the first annual World Congress on Intelligent Transport Systems (ITS) in Paris, France.

Over 3,000 attendees are expected. We have invited Vice President Al Gore to lead the U.S. delegation that will consist of Transportation Secretary Federico Peña and other transportation officials. In the future, ITS World Congress meetings will be held in Yokohama, Japan in 1995 and in Orlando, Florida in 1996.

Whether the Conversion of Defense-Related Technologies To Civilian Use Contributes to the Development of IVHS Technology and How the Process is Being Facilitated

The international comparative study on IVHS emphasized that the United States should evaluate the prospects for transferring defense-related technological capabilities to IVHS development and deployment. Some such activities are occurring as part of the Technology Reinvestment Project (TRP) under the auspices of the U.S. Department of Defense (DOD). There are a number of dual use technologies that could be applied to IVHS. IVHS AMERICA is currently evaluating how it can be effective in defense conversion efforts and the activities of the TRP.

The interest in defense conversion is growing. Of the more than 120 exhibitors at IVHS AMERICA's fourth annual meeting in Atlanta, Georgia, in April 1994, over half were defense and aerospace firms interested in applying their technology to the surface transportation system. For the first time, the exhibitors displayed IVHS products ready for market, not just interesting ideas.

Constraints to the Research, Development and Deployment of IVHS technologies and How These Constraints Are Being Addressed.

The *Strategic Plan For IVHS in the United States* identified many of the non-technical issues that pose challenges to the development and deployment of IVHS technologies. IVHS AMERICA has formed committees to address institutional, legal and environmental issues. The following is a brief discussion of the constraints identified with legal, and environmental issues and our activities.

Institutional Issues. There is a need for new relationships among institutions. Agreement on roles and responsibilities of the participants is the first step in overcoming this challenge. Many institutions will have to adapt to meet the challenges presented by IVHS. The success of IVHS will require new public-private relationships and areas of activity. Government and industry will have to find a means of cooperating. Government practices, which often make joint efforts difficult, may have to be re-examined in light of IVHS. IVHS AMERICA encourages the parties to participate in committee meetings which address these issues.

Legal Issues. Key legal issues include product liability, antitrust, privacy, procurement and intellectual property. The Legal Issues Committee examines the current state of the law in these areas and provides analysis on how they are likely to affect IVHS. It also explores potential solutions to the legal obstacles that are likely to arise.

Currently, work is being undertaken to increase the knowledge of potential partners in IVHS projects in the vital areas of intellectual property and cooperative agreement statutes. Workshops are held and panels of experts are assembled to make these issues clearer and less of a perceived burden. In the area of privacy, a set of privacy principles intended to govern IVHS has been drafted. These principles are undergoing modifications and are being shared with several interested parties to ensure that various perspectives are taken into account. After initial analyses of liability which explored how IVHS might present unique liability relationships, a task group has now been created to work specifically on recommendations for the IVHS industry.

Environmental Issues. IVHS AMERICA Energy and Environment Technical Committee brings together a diverse group to discuss environmental issues and IVHS.

On June 6, 1994, IVHS AMERICA joined the U.S. DOT, George Mason University, the University of Minnesota, the Environmental Defense Fund, the Surface Transportation Policy Project, the California Department of Transportation and the U.S. Environmental Protection Agency in sponsoring "The National Policy Conference on Intelligent Transportation Systems and the Environment."

In addition, we have included a substantially expanded section on IVHS and the environment in the National IVHS Program Plan. That section provides specific goals and objectives for reducing the energy and environmental impact of surface transportation by aiming to:

- Reduce harmful emissions per unit of travel;
- Reduce energy consumption per unit of travel;
- Reduce new right-of-way requirements and community disruption;
- Reduce fuel wasted; and
- Enhance efforts to attain air quality goals.

To achieve these goals, two basic courses of action will be necessary. First, IVHS technologies should be used to improve the environment by including them in the engineering of transportation systems. Second, when transportation system changes are made which do incorporate IVHS technologies, the impact of these changes on air quality needs to be ascertained.

Much work remains to be done in demonstrating the benefits of IVHS technologies to air quality. At present, there is only minimal cooperation between officials who plan and operate IVHS systems and those who monitor their environmental impact. The real challenges in improving air quality through IVHS technology are: how to allocate transit and use of personal transportation to their most appropriate roles; and how to get the largest producers of carbon monoxide and hydrocarbons off the road.

Federal interest in IVHS must be considered in conjunction with the Clean Air Act Amendments of 1990, which set rigorous objectives for improving the quality of air in areas which do not meet federal air quality standards for ozone and carbon monoxide. In severe and extreme non-attainment areas, employers of 100 or more persons have until 1996 to implement Trip Reduction Plans, which are designed to reduce the number of employees who commute to and from work as solo drivers. The purpose of these programs is to promote mass transit, ridesharing, and even bicycling and walking for the work commute as a means of reducing motor vehicle emissions.

IVHS has the potential to reduce energy consumption and improve air quality through facilitating traffic flow and reducing the vehicle miles traveled by automobiles through traffic management, navigational aids, support to transit and paratransit and encouragement of their use, and high occupancy vehicle (HOV) lanes. IVHS also offers the capability for controlling additional demand that might reduce environmental and energy efficiency gains.

IVHS Funding Needs and Resources

Over the next 20 years, IVHS will become a $209 billion industry. The private sector, coupled with consumer investment, will support some 80 percent of the program. The remaining 20 percent will come from government at all levels. But to reach that point, we need to continue receiving federal funding for infrastructure deployment and to convince the private sector and state and local governments that the federal government is serious about deploying IVHS.

Private sector funding will be oriented toward products and services that respond to marketplace directions. The consumer will pay the largest portion of the cost for IVHS, primarily through the purchase of vehicles, equipment, and services. Consumer acceptance and the resulting private markets will be highly influenced, however, by public investments and policies regarding infrastructure facilities and related services.

Most importantly, investment in IVHS will save money in the long term. Traffic congestion costs our economy more than $100 billion a year in lost productivity. Traffic accidents, more than half of which are caused by congestion, cost us another $70 billion annually. Traffic congestion also has an enormous effect on the environment. Job creation will be enhanced through market and infrastructure development.

Challenges For Deployment

We are faced with the following challenges for deployment of intelligent transportation systems in the United States:

- Enhance Deployment Funding. Deployment funding for IVHS must be increased. The $659 million authorized over a six-year period in ISTEA applies mainly to research and development and operational testing. This alone will not lead to deployment of a national IVHS program. IVHS funding must be applied toward achieving a unified transportation system and for public transit.

- Develop Uniform National Standards. We must develop uniform national standards and protocols. A well-administered standards and protocols program will ensure compatibility and interoperability among IVHS systems and services.

- Increase Support and Involvement of Local Officials in IVHS. We need to increase the involvement of local government officials in the IVHS program. However, their participation is limited due to a shortage of their funding resources. There is a fear and a perception among local officials that IVHS is yet another system being pushed on them without funding. We are now developing electronic bulletin board forums to improve communications. There is much more to be done, especially with providing ways for local governments to participate in the many IVHS planning activities.

Mr. Chairman, this concludes my testimony. I would like to request that it be included in the official record. Again, Mr. Chairman, thank you and the members of the subcommittee for this opportunity to testify today.

APPENDIX I

Funding Sources for AIMS as listed in the Intermodal Surface Transportation Efficiency Act (ISTEA). This information is listed in *Guidelines for AIMS*, prepared by the IVHS AMERICA Advanced Traffic Management Systems Committee, May 1992.

In Section 6055, DOT shall assist state and local officials in developing plans for area-wide traffic management control centers and may make grants for feasibility and planning studies for deployment and implementation of IVHS.

ISTEA also provides that any interagency traffic and incident management entity, including independent public authorities contracted by a state or implementation of a traffic management system for a designated corridor, may be eligible to receive federal assistance for development of an IVHS program.

In addition, section 6056 of ISTEA provides that after allocation to the corridors, the balance of IVHS funds shall be allocated to state and local entities for application of IVHS "in corridors and areas where the application of such systems and associated technologies will make a potential contribution to the implementation of the Secretary's plan for IVHS."

Funding under section 6058 provides an authorization of $27 million per fiscal years 1993 through 1997 for other IVHS activities (other than 6056). However, the federal share shall not exceed 80 percent on any IVHS projects except those that are determined to be "innovative, high-risk operational or analytical tests that do not attract substantial non-federal commitments, but are determined by DOT as having significant potential to help accomplish long-term goals."

Three other funding sources are identified in ISTEA, namely the National Highway System, the Surface Transportation Program, and the Congestion Mitigation and Air Quality Improvement Program. In addition, it is believed that traditional revenue sources, such as levies, special bonding initiatives, or local gasoline or sales taxes will likely be used.

APPENDIX II

The following is a list of projects that IVHS AMERICA has completed for DOT or is working on:

- *The Strategic Plan for IVHS in the United States* -- submitted it to the U.S. DOT in June 1992. This document serves as a guide for the nationwide deployment of IVHS.

- *Federal Program Recommendations for Fiscal Years 1994 and 1995* to US DOT in October 1992.

- *The National IVHS Program Plan.* Now in its second draft, this document will establish a program for near-term IVHS development and deployment. The process will be completed in December 1994.

- IVHS System Architecture program -- recommended development methodology to the U.S. DOT. Continue to work jointly with them.

- Established and maintains 20 technical committees involving more than 1,000 IVHS leaders from around the world. Volunteers have donated over 15,000 hours of expertise to advise DOT on IVHS.

CAN INTELLIGENT TRANSPORTATION SYSTEMS HELP TO CREATE A HEALTHY AND SUSTAINABLE NATIONAL TRANSPORTATION SYSTEM?

Statement of Hank Dittmar, Executive Director
Surface Transportation Policy Project

Investigations And Oversight Subcommittee
House Public Works and Transportation Committee
June 29, 1994

Chairman Borski and Members of the Committee, thank you for asking me to appear before you today to discuss the very important issue of progress on Intelligent Vehicle Highway Systems (IVHS) initiatives. I am Hank Dittmar, Executive Director of the Surface Transportation Policy Project (STPP). STPP is a non-profit coalition of over one hundred groups whose mission is to reform transportation policy to be socially equitable, economically effective, energy conserving and environmentally sensitive. We are submitting for the record answers to the questions prepared by the Subcommittee. In my remarks this morning I'd like to speak somewhat more broadly about the overall progress of the IVHS effort.

It is entirely appropriate for the Subcommittee to be examining this initiative, as the nation made a major commitment to the development of intelligent transportation technologies with the passage of ISTEA in 1991. Can IVHS or Intelligent Transportation System (ITS) technologies make a real contribution toward meeting the country's need for a healthy and sustainable National Transportation System?

The answer to this question involves answering three related inquiries:

1. Are these emerging technologies serving the right social goals and objectives?
2. Is a proper structure for the evaluation of the impacts of these technologies in place?
3. Is an institutional framework being developed which will allow for successful deployment?

1. Are these emerging technologies serving the right social goals and objectives?

While the goals set for the IVHS program in ISTEA were broadly drawn, the IVHS program plan appears more narrowly focused. The program plan and system architecture assert that the IVHS technologies will both improve air quality and reduce congestion; but it appears that they propose to do so by increasing highway speed, reducing the distance between cars and putting more cars on the road. Such a narrow focus for IVHS fails to recognize the many important objectives for the transportation system. Transportation policy advisor Donald Camph of Aldaron, Inc. has called IVHS a "double-edged sword", offering two possible visions for America's transportation future, either more roads with more cars, now souped up with fancy technology, or " an opportunity to harness technology to empower people by providing access -- to jobs, to health services, to cultural and recreational opportunities -- and by helping to address questions of social equity, environmental quality and community cohesion."

While renaming IVHS as Intelligent Transportation Systems (ITS) would make a good start, I think much more is needed. The IVHS Program Plan needs to be recast in terms of two broad sets of goals. The first can be characterized as societal goal and they consist of a focus on accessibility to opportunity for all Americans rather than mobility for those equipped with advance autos, on conservation of resources and sustainability in terms of both the human and natural environment, and upon strategic economic investment, particularly in

supporting local and regional economies. These broad national goals would take Intelligent Transportation Systems past the narrow focus on mobility to a broader focus on the reasons people move in the first place -- and we might find that if we do things right these goal's can be met with fewer cars on the road not more cars crowded closer together.

These broad goals need to be supplemented with some transportation system goals, for the real promise of ITS lies in tying our different transportation modes together into one national and metropolitan transportation system and managing that system to its highest economic effectiveness. These system goals include the integration of different modes, informing the system users and operators, and creating system redundancy and flexibility by lessening reliance on the highway mode. The essential technology activities that must take place before this vision can become a reality are the following: developing communications capabilities, surveillance and monitoring systems and the capability for using information to manage and operate the system in real time.

The current package of user services being put forth by FHWA looks more like a loosely bundled package of technologies seeking a place on the shelf than a set of applications targeted to meet these kind of national goals and objectives. The Program Plan needs to be recast in terms of these goals above if IVHS/ITS wishes to get beyond the research phase into the era of broad and ubiquitous application.

2. Is a proper structure for the evaluation of the impacts of these technologies in place?

Jerry Mander of the Elmwood Institute proposes a number of relevant principles with respect to new technology that are relevant to the development of IVHS. He states:

> "Since most of what we are told about new technology comes from its proponents, be deeply skeptical of all claims. . .Eschew the idea that

> technology is neutral or value free. Every technology has inherent and identifiable social, political and environmental consequences. Negative attributes are slow to emerge. In thinking about technology, emphasize the negative. This brings balance."

STPP fears that the present course of IVHS program development will subject America to the law of unintended consequences. Just as the Interstate program succeeded in its primary goal but had unforeseen results in terms of urban sprawl, destruction of neighborhoods and the deterioration of bypassed small towns, so too IVHS can have such impacts. What will happen to all the cars that are crowded onto these 'smart' freeways when they exit onto the small and 'dumb' streets of our downtowns and suburban centers? Are we creating class based transportation system, with 'smart' drivers, and 'dumb' drivers who can't afford the bells and whistles? What's the cost of providing the infrastructure to ensure safe access for both smart fast trucks and cars on the Interstate and slow dumb cars and trucks? Who pays? Who gains? Who loses?

The IVHS development program lacks a clear and independent program evaluator. It is neither reasonable or fair to ask IVHS America to develop, promote and *evaluate* these technologies. Nor can a highway oriented agency such as FHWA properly house the program office for an Intelligent Transportation System. STPP suggests that Congress require an independent effort to evaluate the social, economic, and environmental impacts of the effort on an ongoing basis. The evaluation should look at both the cumulative and individual impacts of the various technologies. There is a possible role for the national energy laboratories here. As the labs retool to a peacetime economy, their emphasis on a systems approach to technology could be directly applicable. In fact, the Alliance for Transportation Research, in conjunction with Sandia, Los Alamos and STPP, have recently proposed just such an effort to evaluate the Automated Highway System effort to the FHWA.

3. Is an institutional framework being developed which will allow for successful deployment?

The final key to realizing the vast potential of Intelligent Transportation System is the wide and integrated deployment of these technologies as tools for managing and operating the transportation system. Unfortunately, outside of Congressionally authorized projects, there has been little rush to integrating these technologies into the plans and programs being developed by the States and Metropolitan Planning Organizations pursuant to ISTEA. Largely this is due to the failure of the current Program Plan to state goals which can be clearly shared and propose compelling products. The institutional challenge is a real one, however.

As much of the promise of ITS lies in metropolitan areas, it is reasonable that the Metropolitan Planning Organization have a key role in ITS deployment. However, at this time, nobody has made clear to them that the management and operation of the Metropolitan Transportation System is one of their jobs.

Perhaps an overall management system for the Metropolitan Transportation System should be created with the MPO clearly responsible, both to integrate the existing management systems and to provide a focus for ITS technologies.

A second key to deployment is to provide clear guidance that funding can be used for these technologies. While National Highway System funds, Surface Transportation Program funds and CMAQ funds can all be used for these programs, no guidance has been developed to encourage such use -- and states have generally reserved NHS and other funds for their own capital projects. Chairman Borski's bill, H.R. 4305, is a step in the right direction in that it specifically makes NHS funds available for ITS technologies and partnerships.

States and MPOs need to be clearly charged with managing their intermodal systems -- at the same time they must be encouraged to divert funding from

capital expansion to management oriented technologies. They will not do so unless provided incentives and shown that positive results can be achieved. Technical guidance and technical assistance are drastically needed. It is not enough to have outreach meetings in a few parts of the country. DOT needs to reach in to the states and MPOs with classes, staff support and funding.

Mr. Chairman, thank you again for asking me to be here today. Together, we can begin to create an Intelligent, Healthy and Sustainable National Transportation System.

Surface Transportation Policy Project

Response to Questions on IVHS Implementation
Posed by
The Subcommittee on Investigations and Oversight

June 29, 1994

1. *What resources and strategies are being devoted to developing and implementing ITS technology that will make public transportation a more attractive option for travelers?*

   Twenty-eight user services are being developed as part of the national system architecture. These services have been categorized into six broad areas, including, **Travel and Traffic Management, Public Transportation Management, Electronic Payment Services, Commercial Vehicle Operations, Emergency Management, and Advanced Vehicle Safety Systems.** Only <u>one</u> category is directly devoted to public transportation and that category includes only four of the total twenty-eight user services. While a few of the other user services can also address public transportation, the primary focus still seems to emphasize use of the technology to make the private automobile faster, safer and more convenient. Similarly, of the 17 new operational tests recently selected by USDOT, the one which specifically addresses public transit focuses on personalized public transit. A few others would potentially provide information on transit, as well as other mode choices, to travelers through electronic information delivery systems.

   No strategies are being developed to optimize the <u>use</u> of transit and <u>performance</u> of transit within the multimodal transportation system. Such an emphasis would focus on providing transit information to customers who are seeking road information, providing preferential transit access to the highway system and generally providing for higher transit speeds on the highway system in comparison to automobiles. Similar emphasis needs to be given to protecting and promoting bicycle and pedestrian safety, use and system performance.

2. *What provisions are being made to ensure that state and local governments participate in IVHS planning and have adequate funding and technical resources to participate in deployment and to ensure that the systems are maintained after the deployment phase? What's being done to meet the special needs of metropolitan areas to deploy and maintain traffic management systems? What funding sources would be available for metropolitan traffic management systems?*

   Currently, IVHS America is sponsoring regional outreach meetings to address architecture development and to solicit input on its program plan. It is unclear, however, that these meetings are helping state and local governments to address how

to determine the role of IVHS in their transportation systems and how to establish a process that incorporates IVHS options. Instead, these meetings are structured more as paper exercises that don't yet give state and local governments needed guidance on process and decisionmaking.

ISTEA established Metropolitan Planning Organizations as the legitimate forum for regional metropolitan decisionmaking. This is where IVHS decisions should be made as well, as an incorporated part of the planning and programming process. Currently, there is an institutional barrier to this incorporation of IVHS technologies into MPO processes, since it is not yet clear who (states, MPOs) is ultimately responsible for deployment. Legislation to give MPOs planning and programming responsibility for IVHS technologies in metropolitan areas would clarify roles and help to strengthen their ability to use IVHS to address social and environmental issues related to transportation.

National Highway System, Surface Transportation Program and Congestion Mitigation and Air Quality funds are all potentially available for IVHS deployment in particular, and metropolitan traffic management systems in particular. However, 80% of the funding power remains in the hands of the states, who have often been reluctant to allocate sufficient funding sources to establish metropolitan transportation management systems. If these systems are to take advantage of the potential in IVHS to improve intermodal connections and to make the transportation system more sensitive to the natural and human environment, the MPOs must be given guidance on how to incorporate the use of the technologies into their planning processes. They must concurrently be given the fiscal power to allocate federal transportation dollars to system deployment and maintenance.

3. *Are funding levels sufficient to meet the requirements of both research and deployment? Are efforts being made to encourage funding from other sources for deployment and operations?*

ISTEA funds are the only funds currently available for both research and deployment. IVHS activities must either be programmed in Transportation Improvement Programs (TIPs) or earmarked by Congress to receive funding. Congressional earmarking, however, will not build the necessarily integrated system that will maximize the full potential of the technologies.

In fact, IVHS deployment is not based on the question of funding levels, but on the failure to define IVHS products in a way that is compelling enough for State Departments of Departments of Transportation and MPOs to want to include these systems in their fiscally constrained TIPs. Currently, the IVHS program plan does not define the existing and potential technologies in terms of the ultimate users. To receive funding, a clear case needs to be made for the application of the technologies to providing people with access to jobs and services and addressing social,

environmental and economic goals. As such, the program plan should be reformatted to focus on users and to reorient the technologies to focus on broader societal goals.

4. *Are the architectural design and standards-setting processes being coordinated to ensure that the intelligent transportation systems will be implemented in a nationally coordinated manner?*

IVHS America and USDOT have expressed concern that there be a coordinated national system and have held regional forums to discuss the architecture development to date. There has been a disconnect, however, between the consideration of architectural standards and of policy and societal goals for the technologies. Architectural design standards for the interstate system have frequently served as transportation and social policy for the past 40 years. Within the Architecture Consensus Task Force, architectural design and standards-setting processes have unwisely been separated from social, environmental and economic considerations and implications, calling into question the process by which the architecture is being determined.

5. *What major constraints, including environmental, financial, institutional and legal have been identified to the research, development, and deployment of intelligent transportation system technology? How would you propose that these constraints be addressed?*

The primary environmental constraint that exists is that no one yet <u>knows</u> the potential impacts of intelligent transportation system technologies. And until this is explored and examined more comprehensively, there will remain a great danger to developing and deploying an untried system. However, it is unfair and unreasonable to expect IVHS America to develop and promote ITS technologies ,<u>as well as</u> evaluate those technologies. Instead, an independent group, such as the National Energy Laboratories, should be given the responsibility of evaluation, to insure the technologies address real needs and problems.

Financial and institutional constraints lie in the failure to place the potential of intelligent transportation systems to creatively address existing problems (e.g., congestion, air quality, intermodal connections) in the minds of the owners and operators of the transportation system. As was indicated earlier, more funds will be devoted to intelligent transportation technologies if those technologies can be developed so as to provide a real alternative to "building our way out."

6. *Are sufficient resources being devoted to the development and implementation of commercial motor vehicle IVHS technology?*

STPP does not have expertise in the area of commercial motor vehicles. This question is better addressed by an organization that is more familiar with the pertinent issues.

7. *How does the United States compare with other nations in IVHS deployment and commitment of resources?*

   STPP is domestically focused and so does not have expertise with IVHS deployment outside the United States. This question is better addressed by an organization that is more familiar with the pertinent issues.

8. *What plans have been proposed to coordinate the deployment of IVHS technology and services for electronic toll collection? How many states have already developed their own standards, and are these standards compatible?*

   STPP shares the Subcommittee's concern with the proliferation of standards for electronic toll collection. However, we ourselves cannot provide any information on this areas, since it is not within our area of expertise.

9. *How is the conversion of defense-related technologies to civilian use contributing to the development of IVHS technology and how is the process being facilitated?*

   Significant conversion of defense-related technologies to IVHS technologies is taking place outside of the USDOT's defense conversion process. Many corporations that were previously defense-focused are becoming independently involved with the development of IVHS technology. This should be encouraged, as should the use of some defense conversion funding to further facilitate this process.

**TESTIMONY OF MATTHEW EDELMAN,
GENERAL MANAGER, TRANSCOM
HOUSE OF REPRESENTATIVES
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
JUNE 29, 1994**

Mr. Chairman, I am Matthew Edelman, General Manager of TRANSCOM. I appreciate the opportunity to testify in support of the United States Department of Transportation's programs to implement intelligent transportation systems technology (ITS) and to discuss the importance of multi-agency coalitions in implementing this technology. It is particularly fitting that we appear here today with the E-ZPass Interagency Group (IAG) and the I-95 Corridor Coalition. While each of our coalitions is focused on a different mission, we share the common belief that some of the most complex issues in implementing this new technology are best addressed on a multi-agency basis.

The alliance among our three groups goes well beyond mutual broad based support. We are actually working on specific projects to enhance our programs. TRANSCOM and the E-ZPass IAG are working together on an FHWA funded operational test to determine the value of electronic toll collection technology for traffic management. The I-95 Corridor Coalition and TRANSCOM work closely together on a range of programs. Among numerous joint efforts, TRANSCOM serves as the I-95 Coalition's interim communications center. All three coalitions share a number of board members. TRANSCOM's Chairman, John H. Shafer, Executive Director of the New York State Thruway Authority, is a board member of the E-ZPass IAG and Vice-Chairman of the I-95 Coalition. I also serve as Steering Committee Chairman of the I-95 Coalition.

TRANSCOM is a government coalition of fifteen major highway, transit and public safety agencies in the metropolitan New York/New Jersey/Connecticut metropolitan region. While we function administratively as a unit of one of our member agencies, the Port Authority of New York and New Jersey, policy direction and support comes from all of our member agencies. Our region has an extraordinary number of jurisdictions in transportation.

TRANSCOM serves to coordinate the activities of its member agencies during major disruptions to the transportation system resulting from incidents or construction. Everything TRANSCOM does is on a cooperative basis; our coalition is built on respect for the operational autonomy of each of our member agencies and it has no operational authority over any segment of the transportation system.

As diverse as a fifteen agency coalition may sound, the jurisdictional situation in our region is actually far more complex than that. TRANSCOM's Operations Information Center, which is open around the clock, actually ties in to over 100 highway, transit and police agencies. In addition to the facilities of our member agencies, we also communicate, via alpha-numeric pager, phone and fax, with dozens of important county and municipal police agencies, and with the media traffic services. When an agency experiences a major incident, one call to TRANSCOM will ensure that other agencies that need to know are alerted immediately and simultaneously. TRANSCOM ensures that any traveller information resource that a coalition member has available, particularly fixed and portable variable message signs and highway advisory radio systems, will be mobilized to divert travellers as far away as possible from the facility experiencing the incident. In effect, the other members of the coalition mobilize to support the agency experiencing the problem.

All of these efforts are coordinated closely with an understanding of current and planned construction projects. Thus, if an incident is severe enough, TRANSCOM will determine if construction is taking place on a parallel route and request that an agency pull that construction until the incident clears. Our multi-agency construction data base also enables us to protect our member agencies and the travelling public by minimizing simultaneous construction on parallel facilities.

While this testimony is focusing on TRANSCOM's role as a multi-agency test bed for implementing ITS systems, such a "high tech" role is actually a by-product of the "low tech" role of incident notification, regional incident management and construction coordination noted above. It took a number of years to establish the kind of trust and credibility necessary, for

example, to get a construction manager to be willing to modify a project schedule in the name of supporting another agency. However, through the effective working relationships developed through these low tech activities, we actually created an organizational infrastructure which could then be applied to multi-agency implementation of ITS systems.

Intelligent transportation systems technology programs are often implemented on a regionwide basis. Therefore, a given program frequently requires more than one agency to be involved in implementation and operation. Jurisdictional fragmentation is a factor which particularly affects ITS implementation in the metropolitan New York/New Jersey/Connecticut region. TRANSCOM provides the means for its member agencies to take a regional approach to ITS, while still fulfilling their own enormous operational and engineering responsibilities.

Working with its member agencies, and with funding from the Federal Highway Administration, TRANSCOM is currently implementing a regional ITS program. The TRANSMIT operational test (TRANSCOM's System for Managing Incidents and Traffic) is using electronic toll collection (ETC) technology for remote incident detection and traffic management. TRANSMIT is a cooperative effort with the E-ZPass Interagency Group and its first stage deployment will be using New York State Thruway Authority ETC tags along nineteen miles of limited access highway in New York and New Jersey. TRANSCOM's experience in implementing TRANSMIT is relevant to many of the issues being explored in this hearing and I will elaborate on this operational test further on in my testimony.

TRANSCOM also has a program of working with its member agencies on implementing proven technologies, such as highway advisory radio (HAR), electronic variable messages signs (VMS) and remote video surveillance (CCTV) at high incident locations and major decision points in the regional transportation network. While many of our member agencies have plans to invest further in these types of technologies, the TRANSCOM HAR/CCTV/VMS program enhances these investments by taking a regional approach. For example, a major decision point between two states can lie at the end of two planned systems. By placing a VMS at such a location, this program can enhance the effectiveness and inter-relationship between both systems.

Just as TRANSCOM ensures an open flow of incident and construction information among its members by way of pagers, phone and telefax, we are also developing a program to share video information, as well. This interagency remote video network (IRVN) will allow a member agency to see any other member agency's video feeds. For example, an incident on the George Washington Bridge can effect the operations of almost a dozen agencies immediately adjacent to this crossing. If real time video information is of use to any of these agencies, jurisdictional boundaries should not prevent them from making best use of this resource.

A major element of a coordinated approach to the implementation of ITS in the metropolitan New York/New Jersey/Connecticut region is the effort which TRANSCOM and its member agencies have underway to produce a regional architecture. This effort has the goal of producing a cooperative, multi-agency strategy to enhance the coordination of ITS activities and systems throughout the region. It will lead us to the implementation of linkages among each member agency's systems to provide an integrated and multi-modal network. As more ITS systems come on line, the result will be an extraordinary increase in "real time" information on the transportation network. There will also be a major increase in the number and type of resources available for getting information quickly to the traveller. In effect, as our member agencies automate the management of their transportation systems, the regional coordination of these systems will have to be automated, as well. We have an obligation to the travelling public to ensure that jurisdictional boundaries do not serve to reduce the benefits of such major public investments in ITS. The development of this regional architecture will ensure these benefits.

It is also important to put the regional architecture in the context of the national ITS architecture and the architecture being developed for the I-95 Coalition. Each is essential for ensuring mobility but it is also essential that each is compatible with the other two. Therefore, it is extremely important that the agencies involved in developing each of the three architectures work together to obtain this compatibility.

Others at this hearing will be addressing the importance of national standards and

TRANSCOM is supportive of these efforts. An I-95 architecture is also essential because it enhances the flow of people and freight in this Priority Corridor where each region is linked economically to the other. The regional architecture is also essential because it deals with the vast number of intra-regional trips which take place in metropolitan New York, New Jersey, and Connecticut. Our metropolitan area is so large, the number of jurisdictions is so high, and the investment in IVHS systems coming on line is so great, that it is essential that we work together as a region now to ensure compatibility.

Public transportation is an essential element of the regional architecture, and integral to a range of current and planned TRANSCOM programs. Currently, approximately a quarter of the incident information called into TRANSCOM comes from transit agencies. Further, information on incidents and construction on key highway links is made available by TRANSCOM to major bus operators. The working relationships that have already been established with the transit agencies will enhance the implementation of ITS as new systems come on line.

One particularly notable transit ITS project is FHWA's grant to TRANSCOM and its member agencies for the Alternate Bus Routing System (ABRS). Working with the New Jersey Highway Authority, New Jersey Transit Bus, the New Jersey Department of Transportation, and Hughes Aircraft, ABRS is designed to use ITS technology to specifically give transit a competitive edge. Through the use of roadside cameras and a vehicle to roadside communication network, some 400 NJ Transit buses will be given real-time information to be able to choose between the Garden State Parkway and Route 9 approaches to the New Jersey Turnpike at Interchange 11 in Woodbridge.

For many of these FHWA funded ITS systems, the need for more funding for operations after the deployment stage is a critical issue for TRANSCOM. It is, of course, a national issue which is not unique to TRANSCOM. Once a program is no longer an operational test, funds will be required if a system is to continue to function. One example would be the TRANSMIT project noted above. If TRANSMIT is shown to be successful, that is if ETC technology is

indeed shown to be an effective means of incident detection and traffic management, we will be faced with a dilemma. The good news would be that the operational test was a success. The bad news would be that we have a successful capital improvement on our hands with no sure source of operations funding. TRANSCOM already receives an extraordinary local funding commitment from its member agencies in the form of dues to support its base operations. This commitment to our coalition is particularly noteworthy in that many of these agencies are faced with their own severe budget constraints. As part of our own multi-agency strategic planning effort, we will be developing strategics to deal with this critical issue. While we understand that some categories of federal aid can already be used for operations, we would also ask that consideration be given for a funding category specifically oriented towards operations of ITS systems.

A related constraint that TRANSCOM faces with regard to the deployment of ITS is the issue of local share. The historic reasoning behind local share is something that we acknowledge, given the importance for state and local entities to show a commitment to a project. However, given the importance of fostering healthy, active multi-agency coalitions to implement ITS, perhaps consideration should be given to a more flexible set of rules. In TRANSCOM's experience, FHWA has done everything it can to be flexible and supportive within the constraints under which it operates. Over the last few years that we have received FHWA funds, we have gone from 100% federal funding, to the use of credits from member agency funded ITS projects, to project specific match (both in kind and cash). Again, our member agencies already make a major contribution to TRANSCOM in the form of dues. To add funds for local share on top of this could cause their contributions to go up at a rate several times above inflation and could significantly affect the coalition's unique capability to serve as a multi-agency test bed for ITS programs.

In addition to the issues of operations costs and local share, we would also ask that the issue of direct FHWA contracting with multi-agency coalitions such as TRANSCOM be considered. This currently is not a feasible option for the types of funds TRANSCOM receives. Thus all monies are channeled through a state department of transportation. While the state

DOT's we work with do everything in their power to facilitate project implementation, the very structure of the arrangement can be frustrating. Getting a multi-agency coalition to agree on engineering and deployment issues is a daunting enough task in itself. On top of our host agency's (the Port Authority) procedures, we are then faced with having to conform to a state DOT's financial and administrative process, as well. Adding an additional agency review results in at least a doubling of the rigid procedures which need to be followed. While direct contracting would not preclude the kind of valuable engineering review currently done by the state DOT's, it would eliminate an additional layer of financial and administrative review and approval and accelerate ITS project implementation.

The coordination of the deployment of ITS technology and services for electronic toll collection (ETC) is a major focus of TRANSCOM and its member agencies. Early on, TRANSCOM and the E-ZPass Interagency Group saw the potential in this kind of coordination. Our region has the highest number of toll transactions in the country. Thus, it is an extremely fitting location for this kind of coordination to take place. This coordination is what sparked the TRANSMIT operational test noted previously, in which the E-ZPass Interagency Group's ETC technology is being used to manage traffic and detect incidents.

Most of the E-ZPass Interagency Group's member agencies are also TRANSCOM's members. We recognized that by addressing ETC and traffic management simultaneously, there is the potential to obtain scale economies in operations and, ultimately, in costs through not having to implement two entirely separate systems.

Almost 50,000 vehicles are already equipped with E-ZPass transponders for use at two of the New York State Thruway Authority's toll plazas. TRANSMIT will use these same vehicles as anonymous probes. These probes will be a source of traffic information along nineteen miles of adjacent roadway to determine speeds and to help operating authorities to reduce incident detection time, and, as a result, enhance mobility. Installation of the TRANSMIT project is currently taking place, with completion expected in August.

As we noted earlier in this statement, we are now working with Hughes Aircraft in the development of our Alternate Bus Routing System operational test. It is our first project involving a defense related firm, using their technology and experience to advance the transportation field. Our work with Hughes is benefitting both the vendor, by providing a market and a real world test bed for their product, and the transportation agencies, by providing new technologies. However, an issue regarding intellectual property rights of software and hardware developed and used in operational tests has arisen. This issue affected this arrangement and will probably affect subsequent efforts as well. The language in the agreements should be further clarified so that both the public agencies and the private entities are assured that they are being dealt with fairly.

In conclusion, Mr. Chairman, we are in a period of exciting change in transportation, one in which new technological solutions often require new organizational approaches. TRANSCOM very much appreciates the opportunity to appear here today and to address your questions. We would like to invite the members of the Subcommittee and its staff to come to our offices in Jersey City to witness what we and our member agencies are doing to promote regional mobility. Thank you very much.

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Investigations and Oversight,
Committee on Public Works and Transportation,
House of Representatives

For Release on Delivery
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SMART HIGHWAYS

Challenges Facing DOT's Intelligent Vehicle Highway Systems Program

Statement of Barry T. Hill,
Associate Director, Transportation Issues,
Resources, Community, and Economic
Development Division

GAO/T-RCED-94-253

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to testify on the results of the review that the Subcommittee requested of the Department of Transportation's (DOT) Intelligent Vehicle Highway System (IVHS) Program. IVHS encompasses numerous surface transportation applications of electronics, telecommunications, and information processing technology, ranging from electronic toll collections to futuristic fully automated highways. The Intelligent Vehicle Highway System Act of 1991 established a federal program to research, develop, and operationally test IVHS systems and to promote their implementation. Designed to facilitate the deployment of technology that will enhance the efficiency, safety, and convenience of surface transportation, the program is intended to benefit travellers by improving access and saving time, the economy by increasing the productivity of the transportation sector, and the environment by reducing vehicle emissions. The act authorized $659 million for this program for fiscal years 1992 through 1997. For fiscal years 1992 through 1994, the IVHS program received its full authorizations, as well as additional appropriations, for a total of $580 million.

Our testimony today focuses on three areas: DOT's obligation of IVHS funds to date, the progress made in implementing IVHS technologies, and issues that may affect the attainment of IVHS goals. In summary, we found the following:

-- For fiscal years 1992 and 1993, DOT has obligated $272 million for 232 IVHS projects and activities. Over half of this sum--about $159 million--was obligated for operational tests to evaluate the effectiveness and feasibility of specific IVHS technologies. About $60 million has gone to fund basic research and development, and $28 million has been directed to deployment support projects.

-- IVHS technologies are in various stages of maturity: Some are already being used, while others will require additional research, development, testing, and advances in technology applications before they are ready for implementation. For example, electronic toll collection is already being used in Oklahoma, Texas, Michigan, Pennsylvania, and New York and is planned for use in Virginia and California. In addition, some states are using weigh-in-motion technology to help enforce truck weight limits without requiring trucks to stop at check points. In contrast, other IVHS technologies, such as on-board navigation systems and the proposed automated highway system, will require further development and testing before the feasibility of fully deploying these technologies is known.

-- A number of issues could affect the full achievement of IVHS goals. First, IVHS technologies will be costly and their commercial success is uncertain. Their deployment will require substantial investments by the public sector, private industry, and consumers; deployment costs are expected to exceed $200 billion by the year 2011. Second, the development of a system architecture and standards is critical to ensure compatibility among different IVHS technologies and reduce risks to the private and public sector. Third, an effective plan is needed to disseminate information to users on the benefits and successes of IVHS technologies in order to stimulate demand for additional applications. Finally, concerns about maintaining users' privacy must be overcome before consumers accept IVHS technologies.

BACKGROUND

Before discussing the IVHS program in detail, we would like

to provide some background information about the purpose and goals of the IVHS program and how it operates. The United States' IVHS program was established partly in response to the technological successes of the European and Japanese programs in the 1980s. In the Intermodal Surface Transportation Efficiency Act of 1991, the Congress noted that the United States would lose its competitive advantage unless it took action to catch up in this rapidly developing field. At a time when congestion is costing the nation an estimated $100 billion annually in lost productivity, IVHS technologies offer the automobile and the electronics, computer, navigation and communications industries business opportunities to enhance the nation's competitive advantage. Accordingly, the IVHS Act established a comprehensive program to develop IVHS technologies in order to reduce traffic congestion, increase economic productivity, and enhance highway safety. The IVHS program is a three pronged effort that fosters the development of IVHS through (1) basic research and development, (2) operational tests that serve as the bridge between basic research and full deployment, and (3) various deployment support activities that facilitate the implementation of IVHS technologies.

DOT provides federal-level guidance for the IVHS program. In December 1992, DOT issued an IVHS strategic plan, outlining the broad goals and objectives of the program. By the end of 1994, DOT intends to issue a program plan that will specify the steps needed to deploy the full range of IVHS services. Within DOT, the Federal Highway Administration has primary responsibility for implementing the IVHS program. However, the Federal Transit Administration and the National Highway Traffic Safety Administration also have active roles in funding and managing various IVHS projects.

The nationwide effort to develop IVHS extends well beyond the federal government. State and local governments, private

industry, and the research community, including members of academia, are active participants in shaping the program and conducting research and operational tests. Much of the input from these participants comes through the Intelligent Vehicle Highway Society of America (IVHS America). IVHS America and its technical committees serve as a federal advisory committee to DOT and as the primary organizational representative of the IVHS community. DOT identifies research and operational test needs, and establishes contract relationships with program participants. Contracts have been established with 72 academic institutions, national laboratories, and private firms; the federal share of the total costs for each of these projects ranges from 50 to 100 percent.

FUNDING FOR IVHS HAS INCREASED SIGNIFICANTLY SINCE 1991

Federal IVHS funding has grown significantly in recent years. Before the act's passage in 1991, federal funding of IVHS research and technology was about $4 million in fiscal year 1990 and $25 million in fiscal year 1991. By fiscal year 1993, federal obligations had grown to $165 million. This year, DOT plans to spend about $310 million on IVHS activities. As of March 1994, the program had 232 ongoing or planned projects. (See app. I for funding information.)

For fiscal years 1992 and 1993, DOT has obligated $272 million for IVHS projects.[1] About 59 percent, or $159 million, of this sum was obligated for operational tests; 22 percent, or $60 million, for research and development; and 10 percent, or $28 million, for deployment support projects. Appendix II breaks down IVHS obligations by project category.

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[1]DOT was not able to correlate the IVHS funding cited in its budget schedules with those in the project list. As a result, the fiscal year 1992 and 1993 funding levels do not fully reconcile.

IVHS Operational Tests

DOT currently supports 61 ongoing or planned operational tests. Ten projects account for nearly 70 percent of the obligations for operational tests through fiscal year 1993. These projects are generally testing different types of "smart" technologies, such as

-- cars that have on-board navigation systems that display information on congestion and travel times, thereby allowing the driver to elect the quickest route, avoid frustration, and reduce travel time;

-- buses that use navigational satellites to locate and schedule information to dispatchers and provide transit users real-time information on when the next bus is coming;

-- toll booths that reduce congestion and drivers' frustration by allowing travelers to pay tolls without stopping, using electronic tags attached to their windshield that are scanned by equipment at the toll booths; and

-- trucks with vehicle identification systems that automatically capture registration information to assist states in tax collection.

All of these technologies are directed at improving the efficiency of the existing transportation systems and reducing travel time. Appendix III contains a list of the major operational test projects.

Research and Development Projects

In addition to conducting operational tests, DOT promotes IVHS by funding its research and development. In general, research and development projects identify how existing and emerging technologies can be used to enhance the surface transportation system. Through fiscal year 1993, DOT had obligated $60 million, or 22 percent, of the total funding for IVHS on research and development. About a third of this funding for research and development, or $21 million, went to projects supporting the automated highway system (AHS).

DOT has emphasized automated highway research because the IVHS Act required it to develop a fully automated roadway or an automated test track by 1997. By that year, FHWA intends to provide proof of the technical feasibility of AHS concepts, designs, technologies, and functions. The long-term goal of the AHS program is to create a fully automated highway system in which vehicles will interact with the highway and each other to operate with minimal assistance from drivers.

Other major research projects focus on improving highway safety through IVHS technologies. Projects are exploring the feasibility of moving packs of vehicles at high speeds using electronic sensing and communications or developing advanced technologies to prevent or decrease the severity of rear-end collisions. A list of major IVHS research and development projects appears in appendix IV.

Deployment Support Projects

About 10 percent, or $28 million, of the federal IVHS funding has been directed to deployment support projects. One-third of these funds have targeted the development of an IVHS architecture, or framework, that will integrate the various IVHS

technologies to maximize their benefits. Other projects are addressing environmental and legal barriers to the deployment of IVHS technologies and are funding early IVHS studies in 36 cities around the nation. Appendix V lists the major IVHS deployment support activities.

PROGRESS MADE IN IMPLEMENTING IVHS TECHNOLOGIES

The IVHS program is focused on the development of a collection of IVHS technologies intended to improve travel and traffic management for users of automobiles, commercial vehicles and public transit. IVHS technologies are in various stages of maturity: Some are available today, while others will require additional research, development, testing, and advances in technology applications before they are ready for deployment. IVHS technologies have been deployed when their considerable benefits have exceeded their costs. For example, numerous toll facilities have already implemented electronic toll collection. Other technologies, such as in-vehicle route guidance, have not been widely implemented in the United States, in part because of a limited consumer market to date.

Travel and Traffic Management Systems

Travel and traffic management systems are intended to provide drivers and local transportation officials with real-time information on traffic conditions and thereby improve traffic flows and minimize congestion. Emerging IVHS technologies will allow drivers to use home computers to obtain traffic information before beginning a trip and use on-board navigation systems to receive similar traffic information in their vehicles. Advanced Traffic Management Systems (ATMS) will also allow localities to better monitor and manage the movement of traffic on streets and highways. Parts of these technologies are already being used to better manage traffic flows and congestion. For example, by

1990, 26 cities had installed or were planning to install freeway surveillance and control systems. In addition, 36 cities are expected to develop plans for partial ATMSs by 1996.

Electronic toll collections have been among the most widely deployed traffic management IVHS technologies. Electronic toll and traffic management systems have been used throughout the nation because they save drivers time and provide a quick return on investment to their public and private sector users. More than one-half million electronic tags have been issued to vehicles using 20 toll roads, bridges, tunnels, and airports in the United States. On the Oklahoma Turnpike alone, about 230,000 drivers use the tags to pay tolls electronically. When a tagged vehicle passes the electronic toll booth, a sensor reads the tag and deducts the toll, and a sign informs the driver when the account balance is low so the driver can replenish the account. Tags are provided free to users, who receive a 10-percent discount on their tolls. Electronic toll collection technology has been implemented in Dallas, Detroit, Philadelphia, and the New York Thruway and is planned for the Dulles Fastoll project in Virginia and for several California roads. The technology is being considered for the I-95 corridor from Washington, D.C., to Maine.

Compared with the deployment of electronic toll collection technologies, the deployment of automobiles with route guidance systems has been limited in the United States. Attempts to introduce these systems in California in 1984 and 1993 met with limited success because consumers lacked interest in them. In contrast, Japanese industry sold about 500,000 navigation systems, priced between $2,000 and $6,000, between 1987 and 1993; sales for an additional 350,000 systems are projected for 1994. Japanese consumers' demand for the navigation systems followed the Japanese government's already heavy investment in advanced traffic management systems. DOT's IVHS program is supporting

operational tests of on-board navigation systems, most notably through the ADVANCE program in Chicago and the FAST-TRAC project in Oakland County, Michigan. The operational tests, which will be completed in 1996, are described in appendix III.

Technologies for Commercial Vehicles

As we noted in our June 1994 report on highway user fees, Automatic Vehicle Identification (AVI) and Weigh-in-Motion (WIM) technologies are increasingly being employed by states to facilitate the safe and efficient passage of trucks over state lines and gather information to assist states in tax collection.[2] AVI equipment enables states to identify commercial vehicles fitted with transponders as the vehicles pass specific points on the highway. Once a vehicle has been identified, a computer can determine whether it has been registered and has had a recent safety inspection, as well as record its weight and track its passage into or out of a given state. Oregon uses AVI and WIM technologies to administer and enforce its axle-based weight-distance user fee. According to Oregon officials, these technologies have helped minimize that state's administrative and compliance costs.

The most visible of the state efforts employing AVI and WIM is the HELP/Crescent project in six western states. HELP equips trucks with AVI transponders that electronically transmit credentials (registration, legal weight, etc.). In addition, the project places AVI readers and WIM scales along the highway to record operating weight and miles traveled. In combination, these technologies allow trucks equipped with transponders to bypass ports-of-entry and weigh stations as information about

[2] HIGHWAY USER FEES: Updated Data Needed to Determine Whether All Users Pay Their Fair Share (GAO/RCED-94-181) June 7, 1994.

their weight and registration is automatically verified and recorded. The HELP project allows such trucks to travel with minimal stops along an interstate highway route from British Columbia, Canada, through Washington, Oregon, California, Arizona, New Mexico, and Texas. The other prominent AVI/WIM project is Advantage I-75, which will allow trucks equipped with transponders to travel on Interstate 75 from Florida to Michigan and on to Ontario with minimal stops. Both HELP/Crescent[3] and Advantage 75 are IVHS projects that are projected to cost a total of about $32 million; total federal share is expected to reach about $14 million. Overall, about 6 percent of the IVHS program's expenditures have supported the development of IVHS technologies designed to advance commercial vehicle operations.

Public Transit Technologies

Just as advanced traffic management systems will provide real-time traffic information, public transit IVHS technologies will provide real-time information about the availability of transit alternatives. For example, automatic vehicle location (AVL) technology can identify the actual location of transit vehicles using technology such as the satellite-based Global Positioning System.

AVL systems are nearing deployment in 12 cities around the United States and have been fully deployed in six U.S. cities and several Canadian cities, as well as overseas. AVL can benefit transit agencies and passengers in a number of ways. Data from AVL systems can be used to provide real-time updates to passengers on expected transit vehicle arrival times, as well as to warn passengers and system operators of delays. These

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[3] The HELP/Crescent operational test was completed in 1993, and the program's operation was turned over to a private organization.

technologies can thus reduce the uncertainty that many transit users experience, as well as facilitate connections from one transit agency's service to another's. The Kansas City Transportation Authority has used its AVL system to provide real-time passenger information, fine-tune schedules, and improve on-time performance to over 90 percent. About 9 percent of the IVHS program's expenditures have supported the development of IVHS technologies that enhance the convenience and accessibility of public transportation systems.

Safety Technologies

IVHS technologies are also being developed to improve the safety of vehicles and drivers through collision avoidance systems. Many of the safety-related IVHS projects are embedded within DOT's efforts to develop a prototype automated highway system. Conceptually, AHS technologies will increase the capacity and improve the safety of highways by automating a vehicle's brakes, steering, and engine speed to allow high-speed travel at closer distances than human reaction time would permit. Drivers could buy vehicles with the necessary instrumentation or retrofit existing vehicles. Vehicles whose operation could not be automated would, during a period of transition, be driven in lanes without automation.

Some of the technologies that underlie AHS are now in the market or under development. These include sensors that detect obstacles in a vehicle's blind spots and collision-warning systems. In addition, concepts from the defense industry--advanced computing systems, sensors, advanced command and control systems--are being applied. Despite these preliminary successes, the outcome of ongoing AHS research and the prospects for widespread deployment are uncertain at best. Most AHS technologies are at least a decade from actual usage, and some state and local transportation officials question whether the

envisioned systems will ever be practical.

ISSUES AFFECTING FUTURE ACCEPTANCE AND USE OF IVHS TECHNOLOGIES

Although IVHS technologies are being used commercially, the broad vision of the IVHS program to dramatically alter how Americans travel and commute to work may not be realized for many decades. High costs and market uncertainties present the biggest challenges to fully achieving the goals of the IVHS program. In addition, a system architecture must be developed to coordinate and integrate the many IVHS technologies; a plan must be devised for disseminating information on the benefits and successes of IVHS technologies; and a means must be found to ensure the privacy of travelers using advanced information systems.

High Costs and Market Uncertainties

The deployment of a nationwide IVHS transportation network will require substantial investments by the public sector, private industry, and consumers. IVHS America estimates that about $6 billion will be needed through the year 2011 to complete all research and development projects and operational tests and develop a system architecture. Because of the greater risk in assessing new technologies, the public sector is expected to contribute about 80 percent of the needed funding.

To deploy the vast array of IVHS technologies, nearly $210 billion will be required by the year 2011, according to IVHS America. Consumers and the private sector are expected to bear about 80 percent of these costs, including the costs for the computers and information display equipment that are to be installed in vehicles.

Because IVHS technologies are expensive, both public and private investment in them is uncertain. Given current budgetary

pressures, state and local governments may not have the funds needed to purchase, maintain, and operate sophisticated IVHS hardware and software systems. According to a 1993 Oak Ridge National Laboratory study, for example, the public sector would have to spend from $8.5 billion to $26 billion between 1993 and 1997 to install ATMSs in the nation's 75 largest metropolitan areas. But until the public sector has invested in the necessary communications infrastructure, the private sector will have little incentive to sell and install IVHS vehicle equipment. However, the public sector may not be motivated to provide the infrastructure until a substantial number of vehicles has been equipped with IVHS technologies.

Consumers' responses to IVHS technologies are also difficult to predict at this time. Some IVHS applications may be quite marketable because of their price, high perceived benefits, or both. The success of electronic toll collection on the Oklahoma Turnpike is a case in point. However, an automobile driver may be more willing to use an electronic tag for automated toll collection than to purchase an on-board route guidance system costing over $1,000.

The challenge of ensuring maximum benefit from IVHS technologies will not end with the operational tests supported by DOT, or even with the technologies' deployment. The hardware and software supporting these technologies will yield benefits only so long as they are well operated and maintained. Experience with currently used traffic control signal systems suggests that operation and maintenance problems may limit the benefits that consumers can derive from ATMS technologies. In March, we reported that many traffic signal systems around the nation were operating below potential because they were not properly

maintained.[4]

This situation has implications for the future of ATMSs. ATMSs are more complex than current traffic control signal systems, since they are designed to collect and use real-time traffic data to adjust traffic patterns and advise drivers of road conditions. However, ATMSs will include many of the features of today's signal systems--coordinated signal systems, video surveillance of corridors, ramp metering, automated toll collection, and variable message signs. Unless maintenance is adequate, an ATMS could rapidly degrade to the operational level of the system it replaced. DOT estimates that operating and maintaining ATMSs could cost between $640 million and $1.8 billion annually.

Developing a System Architecture

The development of a system architecture and standards is critical for the successful deployment of IVHS technologies in the United States. According to a March 1994 IVHS America report, the lack of an IVHS architecture has hindered the European Community's progress toward an IVHS environment that is seamless across national boundaries and has delayed the anticipated common market for European IVHS products.

A system architecture will define the general framework within which the various parts of the IVHS system will work, while standards will specify in greater detail the technical requirements of individual IVHS applications. For example, the home stereo industry has developed a common architecture and set of standards. As a result, consumers can buy various stereo

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[4] TRANSPORTATION INFRASTRUCTURE: Benefits of Traffic Control Signal Systems Are Not Being Fully Realized (GAO/RCED-94-105) March 30, 1994.

components--compact disc and cassette players, receivers, and speakers--from different manufacturers with the assurance that they will function electronically as an integrated unit.

Similarly, the development of a national IVHS architecture is critical to ensure compatibility among different IVHS technologies and to accelerate the implementation of IVHS by reducing the risks to private and public sector stakeholders. For example, a consumer may be unlikely to purchase on-board vehicle navigation equipment costing $1000 or more unless the equipment can be used in multiple locations. If the traffic management centers in other cities broadcast real-time traffic information in different formats, a navigation system geared to one format will have very limited usefulness. Without assurance of such compatibility, consumers will be reluctant to invest in proprietary equipment with limited range, and manufacturers will consequently have a limited market for IVHS products.

To develop a common national IVHS architecture by mid-1996, DOT instituted the IVHS Architecture Development Program and is studying alternatives produced by four groups of contractors. We believe that it is important for this effort to proceed expeditiously, particularly since the IVHS program is operationally testing many IVHS technologies, additional tests are planned over the next 2 years, and some IVHS technologies are being deployed before national standards have been developed.

DOT's Management of the IVHS Program

DOT is at a crossroads for the IVHS program as it begins to assess the results of operational tests, fund additional research efforts and develop a system architecture. As a result, it must now begin to address important issues affecting the management of the IVHS program. In February 1994, DOT established a Joint IVHS Program Office (JPO) to manage and oversee the IVHS program. The

JPO's mission is to develop and execute policies and plans and provide program leadership for the IVHS program. This central focus within DOT is a positive step forward, particularly since the most striking attribute of the IVHS program is its sheer complexity.

The JPO will enable DOT to lay the groundwork for developing a system architecture and an information clearinghouse. The clearinghouse is particularly important, since one of the primary products of the IVHS program will be information--information from which consumers, private industry, and state and local governments can select. To date, DOT has not developed a comprehensive means of sharing information developed through its research and operational tests. According to IVHS program managers, DOT has placed limited emphasis on ensuring that the results of these efforts are publicized and made available to all interested parties. As we previously stated, many of the decisions to use the technologies will depend on the stakeholders' assessment of costs and risks. However, before stakeholders can make these decisions, they must have information about the technologies that are available. The JPO will play a critical role in developing a program to inform IVHS stakeholders of technology developments and status.

Resolving Privacy Issues

Concerns have arisen about whether IVHS technologies may infringe on users'/travelers' privacy. For example, some electronic toll systems may identify vehicles at toll collection points, thereby creating records of an individual vehicle's location at a certain time. Also, electronic truck clearance technology will require commercial vehicles to transmit data on delivery routes, schedules, and truck weights. Some trucking firms may be reluctant to participate for fear that competitors may obtain and use this information to their advantage. It is

difficult to ascertain at this time how prevalent these concerns may be. However, because of restrictions in state privacy laws and potential users' concerns, the privacy issue is the focus of an IVHS project that DOT is currently funding.

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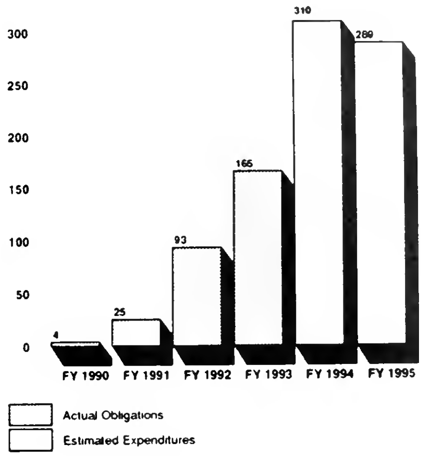
In summary, Mr. Chairman, the Department of Transportation has initiated an ambitious and wide-ranging program to foster the development of IVHS technologies. How travel in America will change as a result of these technologies will depend on the workings of the marketplace, the resolve of the public sector, and the leadership of DOT. Many questions will remain unanswered for several years. If the nation is to realize the potential benefits of a nationwide IVHS network, it will require technologies that are effective and affordable. It will also require a coordinated and cooperative partnership between the public and private sectors and an implementation framework that establishes a sound deployment strategy.

Mr. Chairman, this concludes my statement. We would be happy to answer any questions that you or other Members of the Subcommittee may have.

DOT OBLIGATIONS FOR IVHS ACTIVITIES, FISCAL YEARS 1990-95

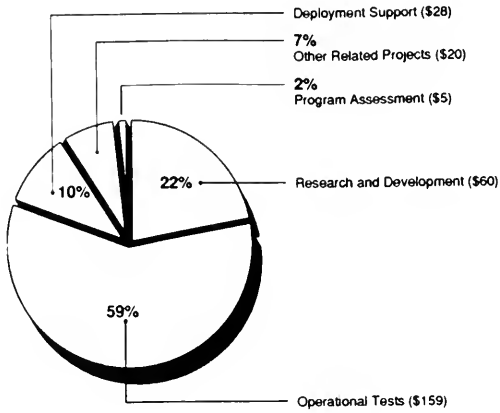
Dollars in Millions



Source: GAO's analysis of DOT's data.

IVHS PROJECT FUNDING, BY PROJECT CATEGORY, FISCAL YEARS 1992-93

Dollars in Millions



Source: GAO's analysis of data from DOT's March 1994 Intelligent Vehicle Highway Systems Project List.

THE 10 IVHS OPERATIONAL TESTS THAT RECEIVED THE MOST DOT FUNDING THROUGH FISCAL YEAR 1993

Project	Description	Federal expenditures through FY 1993
New Jersey Electronic Toll and Traffic Management End date: 1997	Three New Jersey toll authorities are coordinating efforts to implement a regionwide electronic toll collection system on selected New Jersey expressways.	$25,000,000
ADVANCE - IL End date: 1996	This cooperative effort will provide in-vehicle routing instructions to as many as 3,000 Northwest Chicago vehicles. The vehicles, in turn, will serve as probes and provide real-time traffic information to the Traffic Management Center.	$21,000,000
FAST-TRAC - MI End date: 1996	This project involves installing roadside traffic detectors to determine traffic conditions. This information will be relayed to in-vehicle navigation systems, which will show drivers information about traffic congestion and identify optimal routes.	$20,500,000
TRANSCOM Congestion Management Program - NJ, NY, CT End date: Ongoing	This consortium of 15 transportation and public safety agencies has undertaken a series of initiatives to improve responses to traffic incidents.	$11,400,000
RTD (Denver) Smart Bus - CO End date: 1994	This project will provide current bus location and schedule information to dispatchers by equipping buses with Global Positioning System (navigation satellite) receivers.	$8,320,000

Project	Description	Federal expenditures through FY 1993
Integrated Corridor Management - NJ, PA End date: Ongoing	This cooperative effort will provide regional traffic information through a multijurisdictional clearinghouse and further study the incident and traffic management needs of the region.	$6,000,000
HELP/CRESCENT - BC, WA, OR, CA, AZ, NM, TX Deployed: 1993	This multistate, multinational effort is developing a system to enable trucks to drive through the entire network without stopping at weigh stations or ports-of-entry. It used weigh-in-motion and automatic vehicle identification and location technologies to provide enforcement information to governments and fleet management information to the motor carrier industry. The system's operation has been turned over to Help, Inc., a new private organization.	$5,850,000
'CAPITAL' - Washington, D.C. Area Operational Test End date: 3/95	This project is using cellular phone calls to locate vehicles to estimate traffic conditions and congestion. It will examine ways to process this information for use by a traffic management system or individual travelers.	$5,511,733
Suburban Mobility Authority for Regional Transportation (SMART) Project - MI End date: 6/96	SMART establishes an automated dispatch system for on-demand paratransit services in combination with automatic vehicle location to track the paratransit fleet.	$4,500,000

APPENDIX III

Project	Description	Federal expenditure through FY 1993
ADVANTAGE I-75 - FL, GA, TN, KY, OH, MI, Ontario End date: 3/97	This project allows transponder-equipped and properly documented trucks to travel any segment of the I-75 corridor with minimal stopping at weigh/inspection stations. Clearance decisions will be based upon size and weight measurements taken upstream and upon credentials and licensing information stored in a computer data base.	$4,024,685

Source: GAO's analysis of DOT's March 1994 Intelligent Vehicle Highway System Project List.

THE 10 IVHS RESEARCH AND DEVELOPMENT PROJECTS THAT RECEIVED THE MOST DOT FUNDING THROUGH FISCAL YEAR 1993

Project	Description	Federal expenditures through FY 1993
Automated Highway System - Precursor Systems Analyses End date: Fall 1994	The Federal Highway Administration has awarded 15 Precursor Systems Analyses research contracts to investigate issues and risks related to the design, development, and implementation of automated highway systems.	$14,100,000
Human Factors in Advanced Traveler Information Systems and Commercial Vehicle Operations End date: 3/96	This project investigates the factors that affect how drivers and travelers deal with in-vehicle navigation, signing, and warning systems.	$5,251,337
Human Factors Design of Automated Highway Systems End date: 3/96	This project will develop automated highway system scenarios in order to empirically test how drivers will perform and maneuver in an automated highway setting.	$5,086,582
Human Factors in Advanced Traffic Management Systems End date: 12/95	The goal of this study is to investigate and define the human factors involved in a fully functional advanced traffic management system.	$4,216,359
Real-Time Traffic Adaptive Control for IVHS End date: 7/97	This consortium of state and local departments of transportation, industry, and academic organizations will develop a prototype real-time, traffic adaptive signal control system	$3,403,382

Project	Description	Federal expenditures through FY 1993
Design of Support Systems for Advanced Traffic Management Systems End date: 9/97	This study will develop support systems for mature advanced traffic management systems and will determine how to integrate these with the other systems (e.g., signal control, ramp metering, etc.) within the control center.	$2,942,679
PATH End date: 9/95	Current activities are focused on developing technologies to support high-speed platooning, in which packs of vehicles follow each other closely, using electronic sensing and communications, to increase highway capacity and safety.	$1,775,000
Performance Specifications: Countermeasures Against Rear-end Collisions End date: 1/97	This project will lead to the development of performance requirements for advanced technologies to prevent or decrease the severity of rear-end crashes.	$1,700,000
Networkwide Optimization End date: 11/95	The objective of this contract is to develop a computer package that will enable users to (1) coordinate signal-timing and ramp-metering functions, (2) develop metering rates for freeway on ramps, and (3) optimize signal timing at selected intersections and arterials.	$1,403,000
Quantitative Characterization of Vehicle Motion Environment: System Design End date: 12/94	This project will develop a measurement system that can quantify the motions of vehicles moving in traffic. It will help lay the foundation for developing collision avoidance instructions for drivers.	$1,400,000

Source: GAO's analysis of DOT's March 1994 Intelligent Vehicle Highway System Project List.

THE 10 IVHS DEPLOYMENT SUPPORT PROJECTS THAT RECEIVED THE MOST DOT FUNDING THROUGH FISCAL YEAR 1993

Project	Description	Federal expenditures through FY 1993
System Architecture Development End date: 7/96	DOT has contracted with four industry teams to develop candidate IVHS architectures.	$3,951,100
Commercial Vehicle Operations Institutional Issues Studies End date: Various	This project is supporting 47 states in identifying institutional issues that would impede or prevent the achievement of national commercial vehicle operations goals.	$2,155,000
System Architecture Consensus Building End date: 9/96	The contractor will develop an outreach program, including a series of regional briefings, on the progress of the IVHS architecture definition effort.	$2,000,000
System Architecture Manager End date: To be determined	The Architecture Manager will work closely with the contract teams, providing technical review and evaluation of the candidate architectures produced by the teams.	$1,900,000
Electromagnetic Compatibility Testing for IVHS End date: 6/96	This contractor will evaluate the electromagnetic compatibility of various proposed IVHS communications components.	$1,350,000
IVHS and the Environment in Urban Areas End date: 8/94	The goals of this project are to identify and analyze potential environmental benefits from implementing advanced transportation systems and facilitate a greater understanding and dialogue among policy-makers, program administrators, and interested private organizations in selected urban areas.	$760,000

Project	Description	Federal expenditures through FY 1993
Commercial Vehicle Short Range Communication End date: 7/94	This project will evaluate and select a national standard for short range vehicle to roadside communication for commercial operations.	$646,464
IVHS Institutional Issues: George Mason University End date: 2/94	GMU will study critical issues associated with implementing IVHS in Northern Virginia specifically and in the United States generally. It will also solicit private sector involvement in implementing IVHS technologies, such as kiosks, and will conduct workshops on IVHS topics, such as institutional constraints.	$621,729
Dallas, TX Areawide Early Deployment Planning Study End date: 12/94	The goals of the Dallas plan are to (1) coordinate collection and dissemination of real-time traffic information, (2) optimize transportation system operations by coordinating operations among government agencies, and (3) encourage transit and high occupancy vehicle usage.	$600,000
Denver, CO Preliminary Engineering Early Deployment Planning Study End date: 12/94	This deployment project will develop the final design package for the Denver traffic operations center and the field elements needed to support it.	$500,000

Source: GAO's analysis of DOT's March 1994 Intelligent Vehicle Highway System Project List.

IBTTA

INTERNATIONAL BRIDGE, TUNNEL & TURNPIKE ASSOCIATION

Testimony of

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Executive Director and Assistant Secretary -Treasurer
Ohio Turnpike Commission

on behalf of the

International Bridge, Tunnel & Turnpike Association

before the

Investigations & Oversight Subcommittee

Public Works and Transportation Committee
U.S. House of Representatives

Subject: Implementation of IVHS Programs - Electronic Toll and Traffic Management (ETTM)

Hearing Date: Wednesday, June 29, 1994

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Mr. Chairman and members of the Subcommittee, my name is Allan V Johnson. I am the Executive Director of the Ohio Turnpike Commission in Berea, Ohio. I appear before you today as a Past President of the International Bridge, Tunnel & Turnpike Association (IBTTA) and the current Chairman of IBTTA's Government Affairs Task Force. Accompanying me is Neil D. Schuster, IBTTA's Executive Director.

IBTTA is the only trade association representing the world-wide toll industry. Our members consist of toll authorities in 23 countries on five continents. Among these are more than 50 toll agencies in the United States, whose facilities carry more than 3.6 billion vehicles annually.

We appreciate the invitation to testify before the subcommittee on this very important topic. The application of Intelligent Vehicle Highway Systems (IVHS) technologies holds enormous potential for improving the efficiency and safety of our transportation facilities, and I am proud to note that toll facilities have been national leaders in the testing and installation of many of these new technologies.

The term "IVHS" covers a broad range of systems and applications dealing with electronic toll collection, traffic management, and system-wide tracking and information systems. Groups such as IVHS America, of which IBTTA is a founding member, can more adequately address many of the questions posed by the Subcommittee concerning the adequacy of national funding and research. We will focus our comments on the status of Electronic Toll and Traffic Management Systems (ETTM) which are coming into wide use in many toll facility operations.

We appreciate the Subcommittee's recognition of ETTM's importance by arranging today's panel, which will provide a very comprehensive review of both the technological applications and organizational requirements needed to make these systems work effectively.

ETTM Systems

ETTM consists of two major components--Electronic Toll Collection and Traffic Management. The first element is undergoing rapid development and implementation while traffic management systems are under development and early deployment.

ETTM allows for the electronic collection of tolls in an accurate, efficient and cost-effective manner desired by the motoring public. Using ETTM systems, motorists can pay tolls in a hands-free, non-stop environment at highway speeds. ETTM adds toll plaza capacity, improves highway efficiency, reduces fuel consumption, helps reduce congestion, provides cleaner air and increases economic productivity and mobility.

ETTM systems allow drivers with tag readers in their vehicles to pass non-stop through toll plazas. The plaza reader communicates with a vehicle tag and records the transaction. Customers can either pre-pay with cash or by credit card to set up an account and receive a tag, and can then enjoy the convenience and time-savings associated with ETTM. Drivers who choose not to use the ETTM system can continue to pay their tolls manually, and in most cases will also benefit from greater road efficiency.

Current Uses

In the United States, there are at least ten agencies with ETTM systems installed, and many others are either installing activiely consdieaing systems of their own. Among them are:

Texas

The Texas Turnpike Authority has been operating TOLLTAG, an ETTM system on the Dallas North Tollway since 1989. The system improves the agency's efficiency and reduces peak period congestion on the Tollway. This added capacity benefits all motorists, whether they are ETTM subscribers or not.

The Authority has issued more than 71,000 tags, and processes more than 31 million transactions annually, virtually without error. The system operates in all toll lanes on the facility and has the enthusiastic support of Tollway patrons.

Patrons of the Harris County Toll Road Authority in Houston, Texas use the EZ TAG system on 69 lanes. The system accounts for 14,000 tags amounting to nearly 10 percent of the Authority's daily toll transactions.

Oklahoma

ETTM has allowed the Oklahoma Turnpike Authority (OTA) to build new toll roads without traditional toll booths on the main line of the roadway. Motorists who participate in OTA's PIKEPASS system can pay tolls at highway speeds as they pass a toll collection facility. Motorists who do not participate in PIKEPASS exit the main line and pay their toll manually in a toll plaza on a service road parallel to the primary road.

PIKEPASS is operational on OTA's 10-road, 550-mile system. The agency has distributed these tags to more than 222,000 local, regional and interstate customers. The system accounts for 35 percent of all toll transactions in Oklahoma.

Louisiana

The Louisiana Department of Transportation and Development implemented its TOLL-TAG system on the Crescent City Connection in New Orleans in 1989. Here, motorists have purchased some 25,000 car tags, and the facility averages 21,000 transactions daily.

Instituted in 1990, the Greater New Orleans Expressway Commission uses ETTM on its Lake Pontchartrain Causeway, accounting for 50 percent of all daily transactions, and is used by 15,000 cars and 700 trucks.

Illinois

The Illinois State Toll Highway Authority inaugurated its I-PASS ETTM system on 26 lanes of its new North-South Tollway (I-355) in November 1993. With more than 125,000 vehicles using the tollway daily, this is the busiest U.S. toll road to date to establish electronic toll collection. The Authority announced recently that the system will expand to include some 200 toll collection lanes by Thanksgiving Day.

Colorado

The E-470 Public Highway Authority in Englewood, Colorado uses the EXPRESSTOLL system on its Segment I Toll Plaza. Approximately 4,000 cars and trucks use this system, accounting for 30 percent of all daily transactions. The toll plaza includes non-stop ETTM and manual toll lanes.

New York - New Jersey

Applying ETTM to mass transit, more than 1,500 buses pass through the Lincoln Tunnel daily using an ETTM system operated by The Port Authority of New York and New Jersey.

The New York State Thruway Authority reports more than 70,000 E-Z Pass tags in use statewide since their introduction in August 1993. The tags allow non-stop access through the toll facilities at the Grand Island Bridges in Buffalo, and on the Spring Valley, Harriman, Yonkers Barriers and Tappan Zee Bridges.

Georgia

The Georgia Department of Transportation (GDOT) opened the Georgia 400 Extension, a limited-access highway in Atlanta, Georgia. This new facility includes an advanced toll col-lection system in 18 lanes using the Georgia "Cruise Card". By January 1994, sales of the cruise card had exceeded 22,000.

Further plans are to expand ETTM to a total of 20 lanes. Federal funds helped to develop the Georgia 400 Extension, a pilot project under the toll provisions of the Uniform Relocation Assistance Act of 1987.

California

The Foothills Corridor currently operates an electronic toll collection system on three miles of newly opened road. The Transportation Corridor Agencies, which operates the road, will eventually incorporate ETC on all 68 miles of the new system.

The California Department of Transportation (CALTRANS) recently awarded a contract for electronic toll collection on all 9 toll bridges within the state.

Future ETTM Potential

As a result of these many successes, other toll agencies will use ETTM, and several agencies plan to use federal funds to install ETTM systems. These funds are available under the Intelligent Vehicle Highway Systems (IVHS) provisions in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), P.L. 102-240. There are several projects currently taking advantage of ISTEA, or, that might pursue the ISTEA funding options in the future.

Northeast Corridor

Seven toll authorities in the Northeast are participating in an EZ-Pass Inter-Agency Group (IAG) to select a compatible ETTM system for use by motorists throughout the New York, New Jersey and Pennsylvania region. These agencies are the New Jersey Highway Authority, New Jersey Turnpike Authority, New York State Thruway Authority, South Jersey Transportation Authority, Pennsylvania Turnpike Commission, The Port Authority of New York and New Jersey, and MTA Bridges and Tunnels. The region accounts for nearly 40 percent of all toll transactions and 67 percent of all toll revenue in the United States.

This E-Z Pass system will allow region-wide electronic toll collection at all toll facilities. These include river crossings, toll facilities serving central business districts, and intra- and inter-state roads operated by the seven member agencies. The Group recently chose a technology for the region, after extensive study and testing.

While each agency in the group is responsible for installing and operating ETTM on its own facility, the interagency approach will provide maximum convenience to motorists. It is anticipated that implementation of this technology will be phased-in over the next several years.

Eventually, toll agency officials expect to process over one million E-Z Pass transactions daily in several hundred toll plaza lanes. The size and scope of this project and its potential impact on millions of daily commuters and commercial drivers is enormous. Interagency Group members have allocated more than $63 million to fund E-Z Pass activities through 1996. The group will also use an additional $32 million in federal funds available from the Federal Highway Administration under ISTEA.

New England

In the New England area, several transportation agencies are pursuing a Multi-Modal ETTM Program, promising to further illustrate the benefits of IVHS by combining toll, urban mass transit and ground airport facilities in one system. Participants include the Maine Turnpike Authority, Massachusetts Executive Office of Transportation and Construction, Massachusetts Highway Department, Massachusetts Turnpike Authority, Massachusetts Port Authority, New Hampshire Department of Transportation (Bureau of Turnpikes), Rhode Island Turnpike and Bridge Authority, and the Massachusetts Institute of Technology's Region One University Transportation Center.

The New England Group aims to have its ETTM system working soon for advanced taxi toll collection at area airports, river tunnel crossings, and certain roads for commercial traffic.

Kansas

The Kansas Turnpike Authority is in the process of implementing an electronic toll collection system, having recently selected a vendor and are in the process of setting up a 90 day test. Authority officials plan to have K-TAG installed and operational by 1995.

Ohio

My agency, the Ohio Turnpike Authority is also active in this area. We are conducting operational tests on an ETTM system designed to classify vehicles based on their weight, rather than the number of axles. The system is the first of its kind, and we hope to complete testing on various interchanges later this summer.

Florida

Dade County installed an ETTM system on the Rickenbacker and Venetian Causeways in 1994. The Florida Department of Transportation has issued a request for proposal for an ETTM system on Florida's Turnpikes which would eventually result in some 580 lanes of collection.

Maryland

The Maryland Department of Transportation is exploring the use of ETTM in the Washington-Baltimore metropolitan area. Officials hope to implement a system in 1996.

In the long term, ETTM will provide important IVHS and traffic management functions, including the monitoring, collecting and reporting of real-time congestion information to motorists. ETTM also will make possible the use of congestion pricing tests called for in ISTEA. Several metropolitan areas are considering road pricing and other applications.

California

ETTM technology will make it possible for drivers of single occupant vehicles to use and pay for the excess capacity of dedicated high occupancy vehicle lanes. Variable toll rates will allow officials to give commuters an incentive to avoid peak period travel and to form car-pools. For instance, S.R. 91 in Orange County, a planned, all-electronic highway now under construction, will have discounted tolls on two of its four express lanes for high occupancy vehicles. Officials expect to open all four lanes to traffic in late 1995.

The Oakland Bay Bridge has been accepted as the first site for a congestion pricing demonstration project authorized under the ISTEA. Following an initial study, the project is expected to be implemented in 1995 or 1996 after the state legislature approves an increase in the toll rates.

Virginia

The Virginia Department of Transportation, which operates the Dulles Toll Road, has selected an ETTM system for the 13-mile road, which should become operational in late 1994.

The Dulles Greenway Project, a 17-mile extension of the current toll road operated by a private company, plans to incorporate ETTM as a major component of their collection process. The project is set to open in 1996.

Mr. Chairman, this has been a quick review of the ETTM installations and activities that we are aware of at this time. Of all the IVHS technologies envisioned, ETTM systems are among the most widely utilized in real world applications to date, and we look forward to updating the subcommittee in the future on the ongoing progress of these ventures.

The Subcommittee posed several specific questions which we would like to address at this time. As noted earlier in our comments, some of the broader questions about IVHS funding and implementation will certainly be addressed in detail by others testifying to the subcommittee today, so we will focus on those questions most closely relating to ETTM systems.

* Are architectural design & standard setting processes being coordinated to ensure that the intelligent transportation systems will be implemented in a nationally coordinated manner?

> A broad scale effort to establish national technical standards is being coordinated through the efforts of IVHS America. Other organizations are also involved in the standard-setting process on a national and international level.
>
> At present, however, there are no national standards for ETTM applications. While standards are desirable to widen the use of these technologies, it must be recognized that many facilities have made significant investments in systems that may not meet whatever standards are eventually established. The progression towards adopting national standards in ETTM and other IVHS technologies should recognize these capital investments and allow reasonable time for existing facilities to conform.

* What major constraints have been identified to the research, development and deployment of intelligent transportation system technology? How would you propose these constraints be addressed?

> Major constraints on the deployment of systems have involved the uncertainties surrounding new technologies, as well as concerns over federal bureaucratic and legislative actions which could hinder access to radio frequency spectrum or data necessary to make ETTM systems function efficiently.
>
> Of these constraints, uncertainty over new technology is a declining issue as more systems are installed and real-world track records are established allowing transportation facility operators to choose from a field of proven applications in the future.
>
> Uncertainties remain about the actions of the Federal Communications Commission in reallocating radio frequency spectrum for particular uses. Most ETTM systems operate in the 902-928 KHz band. The FCC has proposed segmenting this band for other communications purposes, forcing existing users to move to other ranges within a relatively short period of time, to avoid potential conflicts with other applications. While this is technically possible, such movements would require significant re-engineering of existing systems and substantial cost to the facilities.

Other ETTM systems operate at higher frequencies, including 2.45 GHz. We do not advocate one frequency over another, but we are concerned that, by forcing highway agencies to relocate to another frequency, the FCC will be setting a dangerous precedent that could be repeated in the future. What happens if highway agencies and other public safety entities are forced once again to relocate their operations at a different frequency?

IBTTA and many other agencies and organizations have worked diligently through the rule-making process to communicate our concerns to the FCC on this issue over the past several years, and hope to see it resolved in the near future.

* What plans do you have to coordinate the deployment of IVHS technology and services for electronic toll collection? How many states have already developed their own standards, and are these standards compatible?

There is a variety of manufacturers producing ETTM systems based on differing technical approaches to data communications and handling. Attached for your information is a listing (Attachment A) of U.S. toll facilities which are currently using ETTM systems, or are in the process of choosing or installing a system, and the manufacturer of the systems being used.

As independent agencies, toll facilities will base their decision on which ETTM system to acquire based on their particular needs, conditions, and perceptions of what future information might be needed or services provided. The basic motivation for using these technologies is to improve the efficiency of the road, tunnel or bridge, making it a more attractive and desirable route for their customers to use.

The desire and ability to coordinate services and technologies between agencies will reflect their proximity to other agencies using, or planning to use ETTM, and the degree to which they share customers, and the type of ETTM system which have been installed

The subcommittee will hear today from Mike Zimmerman of the New York State Thruway Authority on behalf of the EZ-Pass Inter-Agency Group. Mr. Zimmerman's testimony will document the efforts seven transportation agencies in a dense, urban corridor to agree on a common technology for future ETTM installations. This agreement will save their customers from having to subscribe to several different programs in order to take advantage of ETTM on their way to work or other destinations in the Philadelphia-New Jersey-New York corridor.

This group effort has provided an amazing display of cooperation amongst very different players to arrive at a common agreement. While full implementation of this EZ-pass system is still to come, the IAG has done a great deal to ensure that compatibility between systems will be maintained. This sort of regional cooperation will be very important in addressing congestion and air quality problems through ETTM and other technologies.

Mr. Chairman and members of the subcommittee, we greatly appreciate this opportunity to share this information with you. We welcome your interest in seeing IVHS applications put to work for the travelling public. We would be pleased to answer any questions you might have and thank you again for this opportunity to testify.

Attachment A

IBTTA

The following toll agencies have installed Electronic Toll Collection equipment:

AGENCY	FACILITY	ETC EQUIPMENT
Texas Turnpike Authority	Dallas North Tollway	AMTECH
Oklahoma Turnpike Authority	10 Turnpikes within the state	AMTECH
Greater New Orleans Expressway Commission	Lake Pontchartrain Causeway	AMTECH
Transportation Corridor Agencies	Foothills Corridor	AT&T
Illinois State Toll Highway Authority	North-South Tollway	AT/Comm
E-470 Public Highway Authority	E-470 Highway	X-Cyte
Harris County Toll Road Authority	Sam Houston and Hardy Toll Roads	AMTECH
Georgia State Tollway Authority	Georgia 400	AMTECH
Louisiana Department of Transportation	Crescent City Connection	AMTECH
New York State Thruway Authority	Tappan Zee Bridge Grand Island Bridges Buffalo City Barrier Spring Valley Barrier	AMTECH

Several other agencies are in the process of either selecting or installing technology. These are:

The Interagency Group: Selected Mark IV in March of this year. The agencies in this group are MTA Bridges & Tunnels, The Port Authority of New York & New Jersey, New Jersey Turnpike Authority, New York State Thruway Authority, New Jersey Highway Authority (Garden State Parkway), The Pennsylvania Turnpike Commission and the South Jersey Transportation Authority (Atlantic City Expressway).

Note: The New York State Thruway has committed to the change in manufacturer and will use Mark IV equipment when their contract with Amtech expires.

MTA Bridges & Tunnels (formerly Triborough Bridge & Tunnel Authority): issued 2 RFPs, one for Systems Integration and the second for Back Office responsibilities. The Systems Integration RFP is being analysed now and an announcement is expected the early part of July. The contractor will integrate Mark IV's equipment previously chosen by the IAG. Five firms have prequalified for bidding on the back office contract. They are to submit detailed RFPs by June 28 to the Authority.

Each agency is on their own for contracting for equipment with full implementation by 1997. MTA is the first to issue RFPs.

Kansas Turnpike Authority: Recently conpleted the selection process required by an RFP. Selected AMTECH Intellitag for testing.

Florida's Turnpike: An RFP is currently in effect.

Virginia Department of Transportation (Dulles Toll Road): Selected Cubic Toll Systems as integrator with SAAB Combitech equipment. Hope to implement by the fall of this year.

California Department of Transportation: Selected MFS Network Technologies with Texas Instruments Equipment earlier this year for all nine bridges in the state.

California Private Transportation Company (S.R. 91): Named MFS Network Technologies with TI equipment for S.R. 91 to be built as an all electronic toll collection road.

Attachment A

Orlando-Orange County Expressway Authority: Set to implement ETC soon using Mark IV equipment.

The New England area is also pursuing a interagency procurement. Agencies involved are Massachusetts Turnpike Authority, MASSPORT, Maine Turnpike Authority, Rhode Island Turnpike & Bridge Authority and New Hampshire Department of Transportation (Bureau of Turnpikes).

Maine Turnpike: issued an RFP for equipment in May of this year. Proposals are due on July 15.

STATEMENT OF
STEVE REICH

EXECUTIVE SECRETARY
MARYLAND TRANSPORTATION AUTHORITY

ON BEHALF OF

THE I-95 CORRIDOR COALITION

BEFORE THE
HOUSE COMMITTEE ON PUBLIC WORKS
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

JUNE 29, 1994

Mr. Chairman, Members of the Subcommittee, I am Steve Reich, Executive Secretary of the Maryland Transportation Authority. I am here today on behalf of the I-95 Corridor Coalition of which I am a member. Thank you for the opportunity to testify in support of the National IVHS program in general and in particular, to support the I-95 Corridor Coalition, which represents the largest and furthest developed of the four national priority corridors designated by the Federal Highway Administration.

Before I begin, I want to make you aware of the high level of coordination that is going on among several of the other organizations that are here today. TRANSCOM is one of the key members of our Coalition and its General Manager, Mr. Matt Edelman, is also chair of our Steering Committee. TRANSCOM serves as the interim communications center for the Coalition. Mr. John Shafer, Executive Director of the New York State Thruway, is Vice Chair of the Coalition's Executive Board as well as Chairman of TRANSCOM. The E-ZPass Interagency Group members also belong to the Coalition and play key roles on our Executive Board, Steering Committee and Working Groups. The Coalition is delighted with the development of the E-ZPass program and believes that it will be a major benefit throughout our region. We belong to IVHS America and in turn, they sit on our Steering Committee. We are all working closely together to ensure that our programs are coordinated and not redundant. What one organization learns is shared with each other and that means that IVHS planning and deployment in the Northeast Corridor is fully integrated and that the Federal dollars utilized are getting the most bang for their buck.

The IVHS program, as incorporated in the 1991 ISTEA legislation, represents a milepost in this Nation's transportation history. After over four decades devoted to infrastructure construction (including 45,000 miles of the Interstate System), we have reached a point where system management, including the use of advanced technology, must come to the forefront in the efficient operation of our comprehensive transportation system. The IVHS program will allow us to make better use of the physical system, reduce congestion, improve safety and lessen pollutants. One of the most cost-effective means of implementing IVHS programs is through the priority corridor element of ISTEA. ISTEA set up criteria for identifying priority corridors in this country, and FHWA designated four such priority Corridors, of which the I-95 Corridor is by far the largest and most unique.

As you know, the I-95 Corridor Coalition is a partnership of the major public and toll road transportation agencies, including rail and transit, which serve the Northeast Corridor of the United States. The mission of the Coalition is to: "Work cooperatively to improve mobility, safety, environmental quality and efficiency of interregional travel in the Northeast through real-time communication and operational management of the transportation system. In doing so, the Coalition will seek to establish an economically beneficial, multi-modal framework for early implementation of appropriate IVHS technology."

As you undertake the review of the IVHS program, we ask for your strong support for the priority corridor program, including the I-95 Corridor Coalition and its five year program to implement the Nation's most comprehensive Intelligent Vehicle Highway System. In establishing the priority corridor program, Congress allocated over $42 million annually to be used by the four designated areas. If the priority corridors are to make progress in implementing their programs, it is essential that this funding be consistently available over the life of the program. Otherwise, only pieces of the program will be implemented in a less than efficient manner.

The justification for the Coalition's program is found in our comprehensive Business Plan which I am submitting to the Subcommittee in conjunction with this statement. Our Business Plan was developed with a "bottoms-up" approach which involved input from all our member agencies. It covers a five year period and includes twenty one projects in three distinct phases:

- Feasibility and Needs Requirements
- Operational Tests and Early Deployment
- Full Deployment and Integration

The $12.5 million that we are requesting for FY 95 represents only a small fraction of the $300-400 million that Coalition member agencies are spending annually on IVHS programs within their individual jurisdictions. The data that the Coalition has collected lists over 300 IVHS projects in our region either underway or in advanced planning with a total value in excess of $1.2 billion. In relation to this total IVHS program, the Coalition funds are modest, however, they provide for the integration and coordination of the individual efforts into a comprehensive interregional system which transcends jurisdictional boundaries to achieve maximum effectiveness. In essence, the Coalition provides the "glue" which ties our agencies together to foster a single transportation system.

With regard to our Business Plan, I was pleased to note that on April 18th, when Secretary Peña addressed the IVHS America annual meeting, he praised the work of the Coalition. The Secretary stated; "The I-95 Northeast Corridor Coalition is the furthest along in its work - having completed its Business Plan - and will serve as a prototype for the future." For your information, we have recently completed updating our Business Plan, which was first issued in May 1993, and will continue to update it annually in the future.

You should also be aware that all projects using FY 93 funds are underway or will soon be contracted; projects using the FY 94 funds are defined and in process; and projects which will be funded from FY 94 earmarks have been identified, prioritized and budgeted. All projects are part of the previously approved 5-year Business Plan. The FY 1995 program is in the Business Plan which is being submitted separately with my written testimony.

Our program is multi-modal and intermodal in its breadth and deals with both the movement of passengers and freight. In the Northeast Corridor, transportation is critical to our economy, and the ability to move both people and goods to and from our ports affects our international trade and balance of payments as well. Amtrak and the American Bus Association are major members of our organization and we have initiated a project to provide outreach to other public transportation carriers in the Northeast. We are particularly concerned about the interface at railroad and airport terminals, ports, bus stations and multi-modal transit terminals such as Union Station, New Carrollton and the National Airport.

The member agencies of our Coalition are working hard to improve our environment. Much of the I-95 Corridor is a designated non-attainment area. The program we have developed will improve air quality and reduce energy consumption by minimizing congestion and providing the users the information they need to choose the most efficient mode and time to travel. The program is particularly beneficial to commercial vehicles which move the majority of manufactured goods in the region. We have put a major emphasis on the

commercial vehicle operation (CVO) issues of the Northeast Corridor. There are several CVO institutional needs studies underway within the Corridor and we see the Coalition's role as that of coordinating the recommendations from the individual studies into an integrated region-wide program. The CVO functions we are focusing on include weigh-in motion, one stop inspections, pre-clearance, seamless borders, AVI, AVL, GPS, and two way communications for all trucks. The Coalition will strongly pursue the CVO program in conjunction with individual state agencies and the private sector.

My testimony has broadly addressed the questions you posed in your invitation. However, there are several specific issues I'd like to speak to in the remaining time. One of the major questions pertains to funding. You asked whether there was sufficient money to meet both research and deployment requirements. In recent years, IVHS research funds have increased significantly and I believe that they are generally adequate. However, as we move from the research and testing phases to deployment, I have grave concern about our ability to fully fund deployment of IVHS programs in cities, regions and states. I believe strongly that the funding level for deployment needs to be increased substantially and that such funds be dedicated for IVHS projects. Otherwise, we will not be able to deliver to the people the program we have promised. Dedicated funding for deployment purposes should be a key element of the next ISTEA legislation.

You also asked us to comment on plans for coordinating electronic toll collection (ETC). You will hear directly from the E-ZPass group on this subject, but for your information, several of the Coalition members lead the E-ZPass program while several more, although not directly participating in E-ZPass, are closely following the project's process in light of their own agency's planning efforts. The progress of E-ZPass is shared among all of the Coalition members. Thus, there is available to our members the information they need to decide on their own ETC program. In addition to E-ZPass, several other Coalition agencies are in various stages of their own programs. Some of these have been underway for a number of years prior to the Coalition coming into existence. We believe that in this early stage of ETC that these individual projects should proceed as planned. The feasibility studies for these projects indicate that they will pay for themselves in as little as two years, and if at a later time a different system is required, the prior investment would still have been cost-effective. We do foresee the upcoming need for consistency among all the ETC systems and in that regard, we have a project in our proposed FY 95 program that would assess the several ETC programs in the Corridor and make recommendations that would lead to full compatibility

for motorists and truckers throughout the Northeast Corridor and eventually throughout the Nation. We will coordinate these efforts with those being undertaken by IVHS America.

Funding for the Coalition included $10.5M in FY 93 and $3.75M in FY 94. ($1.0M from earmarks and $2.75M in FHWA IVHS funds). The reduced funding for the current fiscal year has caused us to modify our program. However, we are making every effort to continue the momentum that we have built, since we will soon be seeing major payoffs from our early efforts. These payoffs include: a fully operational interagency information exchange network which will permit real-time coordination of transportation operations throughout the Corridor; immediate and coordinated responses to major accidents, incidents, severe weather conditions, and other emergency situations; twenty-four hour a day traveller information on a real-time basis at your home, office, vehicle or in other major locations; plus a variety of other "customer" services that will complement these activities.

We urge the Federal government to continue its participation in this Federal/Regional/State partnership to improve intercity-passenger and freight transportation throughout the Northeast Corridor. This Subcommittee has recognized the critical role of IVHS programs in our transportation system, and we are extremely grateful for Congressional support of the I-95 Corridor Coalition. We believe the I-95 Corridor Coalition provides the best example of a comprehensive multi-modal regional approach to an "intelligent transportation system" in the most congested region of our nation. The willingness of our 30 plus individual members to look beyond their own in-state needs to the overall regional interest has been gratifying. The continued congressional support of this program is vital to our nation's and region's best interest.

As part of my submission to the Subcommittee, and in addition to the Business Plan, I am enclosing a paper which summarizes the I-95 Corridor Coalition and its program. It provides a summary of some of our major accomplishments in our first full year of operation.

Once again, thank you for the opportunity to testify today on behalf of the I-95 Corridor Coalition, and I would be pleased to address any questions you may have.

SUBMITTED TO:
The House Committee on Public Works and Transportation Subcommittee on Investigations and Oversight

I-95 CORRIDOR COALITION: ADVANCING INTERMODAL IVHS IN A COMPLEX INSTITUTIONAL CONTEXT

The Northeast Corridor is arguably the most complex and most burdened transportation network in the United States. Unlike other highly travelled corridors of the country which are contained in just a few states, or even within one state, within the Northeast Corridor are more than twenty-five organizations responsible for Interstate highways and major toll roads. To initiate the coordination of transportation service across jurisdictional lines, the major transportation agencies in the Northeast have joined together to form the I-95 Corridor Coalition. The vision of the Coalition is for the providers of transportation services along the Northeast Corridor -- 14 State/Local DOT's and 14 Toll Authorities from Richmond, Virginia to Portland, Maine -- to establish the necessary real-time communication links so that collectively -- as individual entities and as a coordinated team -- they might operate their part of the system on a real-time basis using IVHS technology for the benefit of their travel customers in the corridor. To help achieve this vision, a 5-year Business Plan has been developed, including 21 projects which define the framework by which the individual agency programs will be linked. It is expected that each member agency will continue its IVHS development. In fact, less than 4% of the total IVHS expenditures in the Northeast will come from the Coalition. Rather, these are corridor-wide projects which no single agency would initiate on their own, or interregional activities which are best accomplished by pooling resources.

The I-95 Corridor Coalition is a partnership of the major public and private transportation agencies which serve the Northeast Corridor of the United States. The mission of the Coalition is to:

"Work cooperatively to improve mobility, safety, environmental quality and efficiency of interregional travel in the Northeast through real-time communication and operational management of the transportation system. In doing so, the Coalition will seek to establish an economically beneficial, multi-modal framework for early implementation of appropriate IVHS technology."

The Northeast Corridor is arguably the most complex and most burdened transportation network in the United States. With over 50 million in population, the Northeast Corridor is served by 13 major airports, over 2 dozen major rail stations, and 11 major sea ports. The highway system consists of approximately 7,000 miles of Interstate and 22,500 miles of principal arterials and expressways/freeways (See Figure 1). Nearly 250 billion vehicle miles of travel on Interstate highways and principal arterials help to contribute to the status of eight metropolitan areas as non-attainment for ozone.

While transportation professionals in the Northeast are used to handling complex transportation issues, the corridor is fragmented in terms of political boundaries and agency jurisdictions. For example, unlike other highly travelled corridors of the country which are contained in just a few states, or even within one state, within the I-95 Corridor are more than twenty-five organizations responsible for Interstate highways and major toll roads.

June 29, 1994

Among the primary modes of transportation -- air, rail, and highways -- it's probably fair to say that aside from a few of the toll authorities, highway providers have been the least active in terms of real time communication and coordinated intervention in system operations. However, the technology is emerging to facilitate significant breakthroughs that will enable highway agencies to better relate and communicate with one another, with sister modes, and most importantly with customers, who have a thirst for information about what is happening right now on the whole system. Customers want information on the performance of the system as it might affect them, and what their options may be to cope with both systemic and unexpected interruptions in service.

Individual coalition members have succeeded in planning, financing and constructing a breathtaking web of interconnected transportation facilities -- and some, especially toll authorities, have already established a tradition of communicating with customers on a real time basis. But in past years individual agencies have largely confined their purview to what they individually own, finance, and maintain, without a holistic, customer-oriented perspective.

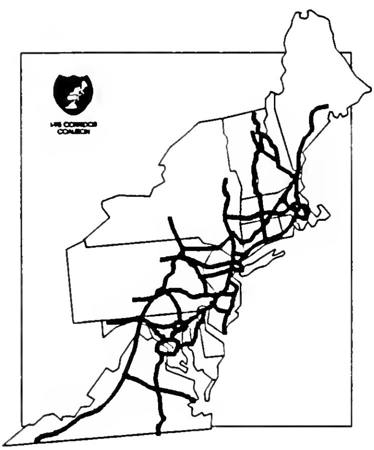

Figure 1. The Northeast Corridor -- home to the Nation's business, recreational, and residential needs.

The major transportation agencies in the Northeast have joined together to form the I-95 Corridor Coalition. Included in the Coalition are each of the 12 DOT's in the Corridor stretching from Maine to Virginia, 12 toll authorities that operate major facilities within the corridor, the transportation departments of Washington D.C. and New York City.

The Federal role is strong, with USDOT representation consisting of the Federal Highway Administration (FHWA), Federal Railroad Administration, Federal Transit Administration, and the USDOT Office of Intermodalism (the role of FHWA in assisting the Coalition to form and get going cannot be overstated). The Coalition also includes AMTRAK, TRANSCOM, the ATA Foundation, the National Private Truck Council, the AAA Foundation for Safety, IVHS America, and the American Bus Association.

The vision for the coalition is really fairly simple, though the implications will be far-reaching and the challenges along the way may be difficult and complex. The vision is for the providers of transportation services along the I-95 Corridor -- from Richmond, Virginia to Portland, Maine -- to establish the necessary communication links so that collectively -- as individual entities and as a coordinated team -- they might operate their part of the system for the benefit of their

travel customers whose piece of the total market might extend well beyond individual boundaries. The vision is customer driven, it is focused on communication with customers and with each other, and it emphasizes the idea that the Coalition members must intervene in a coordinated way in the real-time operation of their part of the total system.

To help realize this vision, the Coalition established an organization which is managed by an Executive Board and a Steering Committee, with specific tasks performed by working groups (see Figure 2).

The Executive Board is comprised of the Chief Administrative Officers of the member agencies while the Steering Committee is made up of senior technical and policy staff persons from each agency. Working groups are built around key staff, having appropriate responsibility and experience in focus areas such as incident management, internal communications, functional needs, privatization, and organizational issues. In addition, a highly competent team of consultants has been retained, to provide further technical depth as well as assist with the every-day activities of the Coalition.

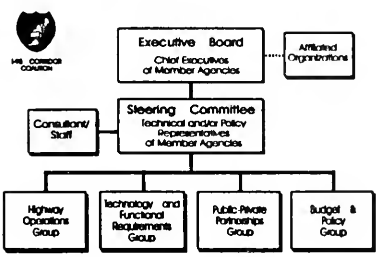

Figure 2. I-95 Coalition Organization Structure

In two years, the Coalition has achieved several major milestones:

- FHWA provided initial staffing support and federally funded "seed" money in 1993 for the purpose of getting the Coalition on its feet by providing for staffing/consultant resources, and assisting in the definition of mission, objectives and the business plan. Consultant proposals were requested, and a joint-venture between Parsons Brinkerhoff-Farradyne-JHK & Associates, called the I-95 Northeast Consultants was selected.

- TRANSCOM is serving as the first phase communications center for the Corridor. The member agencies have already benefitted from the process by which operating agencies share information on severe incidents and weather emergencies which have an interregional effect on transportation.

- Four working groups were established and have been producing results. Their short-term initiatives included assembling a corridor-wide incident management guide, arranging for the exchange of construction and major event information, developing an electronic-mail system for technology-transfer among members, determining the "user" needs of the Corridor, and holding a highly-successful public/private partnerships workshop including over 100 private companies.

- A 5-year Business Plan was developed and is continually being updated, providing the framework from which the Coalition will operate.

- Congress earmarked $10.5M in the 1993 IVHS Operational Test fund, and the Coalition has undertaken an ambitious

first-year program, including priority projects from the business plan, which will benefit the corridor as a whole. Congress further earmarked $1M in the 1994 Operational Test fund, which along with additional FHWA discretionary funds, will provide the resources for carrying-out our second-year program.

- A Funding Task Force was formed, with membership from both the Executive Board and Steering Committee. The task force developed a proposal, which has been approved by the FHWA, depicting how Federal funds would be spent for the Coalition, including matching requirements and DBE goals.

There are 21 projects defined in the 5-year Business Plan. These projects supplement, add value to, and tie together individual member programs (see Table 1). Each member agency is expected to continue with its own IVHS development. In fact, less than 4% of the total IVHS expenditures in the Northeast is expected to come from the Coalition. Rather, these are projects which no single agency could be expected to fund on its own, or interregional activities which are best accomplished by pooling resources. A projected breakdown of this expected spending is shown in Figure 3.

While the 21 projects are defined in general terms, 10 projects have been specifically defined, and were adopted as first-year projects. It is to these projects that the initial $10.5 million has been applied; it is by these projects that the Coalition's success will be measured over the short term.

The first, and most prominent, is the Information Exchange Network, a dedicated electronic information exchange system. The system includes work stations for each agency with data and graphic displays, potential video insertion, and the capability of an automatic alerting system. The system is currently under design by the I-95 Northeast Consultants, and should be operational within the next year.

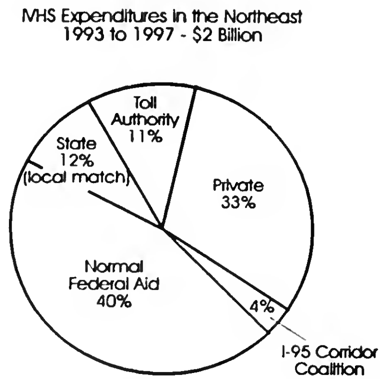

Figure 3. I-95 Corridor Coalition Funds as compared to total IVHS Spending in the Northeast Corridor

There is a project aimed at developing standard operating procedures for major incident notification and fixed-action procedures such as construction, maintenance, and special events. The guidelines will identify those types of accidents or incidents which require multi-agency response and the procedures to be used in the field to coordinate on-site activities.

Also directly related is a project to coordinate the use of variable message signs (VMS) and highway advisory radio (HAR), tools common to a number of the operating agencies. This project would provide a deployment strategy

Table 1. I-95 Corridor Coalition Business Plan Projects		
Internal Coalition Operations	**Customer/User Services**	**Special Studies and Surveys**
Information Exchange Network*	Incident Management*	Surveillance Requirements - Technology*
User Needs and Marketability*	Commercial Vehicle Operations*	Public/Private Sector Outreach*
Consultant Support Services*	Traveler Information Services*	Technology Exchange and Training Program
Coordinated VMS/HAR System*	Corridor-wide AVI/ETTM Feasibility	Passenger/Freight Supply and Demand Analysis
Intermodal Outreach and Information Exchange*	Emergency Response System	Institutional Barriers and Issues
Communications Infrastructure Opportunities	Rural "MAYDAY"/800 Call-in System	
Feasibility of Regional Communications Centers	Automated Highway System (AHS) Corridor Identification	
Long Range Strategic Plan		
Corridor-wide Decision Support/Expert System		

* Denotes Year-One Project

for Corridor-wide communications, 24 hours a day, 7 days per week, utilizing consistent messages and guidelines. Both of these projects are also being carried out by the I-95 Northeast Consultants.

A recently advertised project, focussing on determining what are the conditions on the transportation network and getting this information into the Coalition's Information Exchange System as quickly as possible, is undergoing consultant-selection. The initial part of this project includes a needs analysis of agency requirements concerning detection and surveillance, and the development of several operational tests to be later advertised.

Likewise, a project has recently undergone consultant selection focussing on providing information to the users/customers of the Coalition's transportation member agencies. This is a multi-year activity with the first phase defining the existing information services that are available and how effective they are in satisfying user needs.

A separate project pertaining to Commercial Vehicle Operations, involving the determination of information needs for truckers along the Northeast Corridor, as well as coordinating the recommendations that will be developed by several FHWA sponsored CVO studies soon to be underway in the

Corridor, is in the consultant negotiation stage. Also at that stage, a project to conduct small sample surveys of the various other users in the Corridor, to quantify their perceived needs concerning information and other traveler assistance. Users include long distance commuters, intercity business travelers, and recreational travelers.

Another first-year project involves a concerted effort to define where coordination among the current Coalition agencies and other modes of transportation is most important and to establish satisfactory mechanisms to ensure appropriate and timely exchange of information. The project would identify intermodal exchange opportunities, define sources of this information, and evaluate the required intermodal linkages.

The current prime consultant has also been given the responsibility to assist with day-to-day activities involved with running the Coalition. Their responsibilities include supporting the annual updates to the Business Plan, development of scopes of services for all projects, and the logistical and administrative arrangements connected with the many meetings held at all levels of the Coalition. In addition, the consultant supported a recently-held public/private partnerships workshop.

There is early evidence that the Coalition process is succeeding. Member agency staffs have built informal real-time communication links through phone and fax in anticipation of the more sophisticated network soon to come. Already, southbound travellers in New York and New Jersey have been advised of long term service disruptions at strategic locations in Pennsylvania, Delaware, Maryland and Virginia. Northbounders in Connecticut have been notified of unexpected incidents in Rhode Island and Massachusetts. Travellers from Maine to Virginia were advised of the I-95 Corridor Coalition's operational readiness on Highway Advisory Radio last Thanksgiving. Indeed the culture of cooperation has already begun. It is a culture strengthened by voluntary cooperation and professionalism.

The technology to begin is at hand. The long-term question is whether, in the fragmented institutional world which defines our region of the country, the Coalition can pull together with such coherence that customers perceive a convenient, virtually seamless continuum as they traverse the various modal segments of the corridor. That's the question. The long-term answer lies in whether each member of the Coalition continues to perceive a net gain from working more closely together in the here and now operation of the total system. The early evidence provides reason for optimism.

The I-95 Corridor Coalition has the opportunity to break dramatic new ground in bringing multi-modal IVHS applications to the Northeast Corridor. Notwithstanding the inherent challenge of launching a voluntary effort among 26 independent transportation agencies, the compelling nature of the mission is forging an alliance which is already bearing fruit. Thanks to the selfless commitment of transportation leaders and professionals in member agencies, the Coalition is off to a good start.

I-95 Corridor Coalition

For more information on the I-95 Corridor Coalition, feel free to contact: Mr. Hal Kassoff, Chairman of the Executive Board at (410) 333-1111; Mr. Matt Edelman, Chairman of the Steering Committee at (201) 963-4033; Mr. Steve Kuciemba, Vice-Chairman of the Steering Committee at (410) 787-5884; or Mr. Morey Rothenberg, Program Manager for the Northeast Consultants at (703) 370-2411.

STATEMENT OF
MICHAEL ZIMMERMAN

DIRECTOR OF ADMINISTRATIVE SERVICES
NEW YORK STATE THRUWAY AUTHORITY

ON BEHALF OF

THE E-ZPASS INTERAGENCY GROUP POLICY COMMITTEE

BEFORE THE
HOUSE COMMITTEE ON PUBLIC WORKS
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

JUNE 29,1994

Mr. Chairman and Members of the Subcommittee. I am Michael Zimmerman, Director of Administrative Services of the New York State Thruway Authority and Chair of the E-ZPass Interagency Group Policy Committee which I represent here today.

There are no free roads. You may have heard that axiom often articulated by the International Bridge, Tunnel and Turnpike Association. Every highway, bridge and tunnel in this country has cost money to construct, to maintain and, eventually, to rehabilitate or reconstruct. As late as ten or twelve years ago, it was widely held in government and transportation circles that those costs would be borne by the taxpayers rather than users and that tolls were an anachronism of the 1950's which would soon go the way of the dinosaur. More recently, as the nation has faced difficult economic times and transportation dollars have become scarce at all levels of government, user fees - tolls - have widely been recognized as a fair, practical and effective method of

transportation funding. Several states, including my own State of New York, have decided to retain tolls well into the future even though the original bond indebtedness is expiring.

But, toll organizations around the country face many of the same problems associated with traffic growth as do their taxpayer supported counterparts. More and more vehicles are using the nation's highways and capacities are being stretched to the limit or exceeded. Toll plaza expansion to deal with the increased volume is, at best, very expensive and faces environmental impact and similar roadblocks. In many of the nation's urban areas, New York City being a case in point, there simply isn't room at many toll plazas to accommodate expansion.

For these and other reasons, the seven principal members of what eventually came to be known as the E-ZPass Interagency Group individually recognized in the late 1980's that a long awaited technology - electronic toll collection (ETC) - was finally maturing to a point where it could meet the high degree of accuracy and reliability demanded for use in toll collection. They also recognized that ETC could be the answer to toll plaza capacity problems and that it had the following additional benefits:

- Reduction of toll plaza congestion attributable to increased throughput. (A staffed lane can handle about 350 vehicles per hour; an ETC lane anywhere from 900 to 1200 or more depending on whether a traditional toll lane is used as

opposed to open highway style toll collection as now used in Oklahoma and Georgia.)

- Improved air quality attributable to fewer idling vehicles.
- Mitigation of the need for costly and difficult toll plaza expansion to respond to capacity issues.
- Improved convenience for passenger and commercial customers.
- Improved economies and efficiencies in both toll collection and auditing.
- Facilitation of certain traffic management functions which can use ETC as a backbone.

Six of the agencies - the New Jersey Highway Authority, New Jersey Turnpike Authority, New York State Thruway Authority, Pennsylvania Turnpike Commission, Port Authority of New York and New Jersey and Triborough Bridge and Tunnel Authority - came together in the late 1980's to share information on their respective efforts and to discuss issues of common concern such as interference in the operation of each other's systems. By June of 1990, it was apparent to the agencies that the answer to their concerns lay in the concept of a regional ETC system utilizing a single vehicle mounted "tag" which would be read in the lanes of each of the agencies through the use of antenna/reader configurations from a common supplier. The Atlantic City Expressway, now part of the South Jersey Transportation Authority, subsequently became the

seventh principal participating agency. The agencies adopted a more formal structure and mission statement and, as the E-ZPass Interagency Group or IAG as we are commonly known, began a several year process to jointly procure and implement ETC in New York, New Jersey and Pennsylvania. Collectively, the IAG accounts for 1.4 billion or 40% of the nation's annual toll transactions. They account for 67% of the nation's annual toll revenue. The scope of the IAG's planned ETC implementation involves over 1100 lanes in some 200 toll plazas distributed over 1500 miles of roadway.

You may well imagine the logistical difficulty of seven agencies in three states each governed by its own Board of Directors, each with different purchasing laws and regulations, each with different operational and political agendas and each with a different perception of technological needs, all attempting to come to terms on system specifications and then to articulate them along with business terms and conditions in a Request for Proposal. But we did exactly that. Our task was made that much more difficult by the fact that there was no technical or communication standard in place for ETC products. While a number of products were available, most of them were unproven and none of them are interoperable with any others. Some use read-only technology where the vehicle's tag is simply read as it is interrogated by a reader. Others use the more sophisticated read-write technology where messages (e.g., the point of entry on a toll

highway using a ticket system) can be written to the tag and then read along with other data at a later interrogation point.

In March of this year, the IAG announced the selection of Mark IV Industries of Amherst, New York to provide its ETC tags and readers. Both the Mark IV product, a read- write system, and the other finalist read-write product manufactured by Amtech Systems Corporation of Dallas, Texas were subjected to rigorous testing over some eighteen months to assure their ability to meet the IAG's very stringent requirements. To our knowledge, no other ETC systems have been put to this level of scrutiny. Both systems were found to meet our technical requirements. As I speak, agencies are finalizing their individual implementation plans.

The process has not been without its problems and impediments. Some of those have their origins at the federal level. For example:

- In the middle of our procurement, The Federal Communications Commission announced a Notice of Proposed Rule Making (NPRM No. 93-61). The Rule as proposed would have carved up the 902-928 MHz band (where most available ETC systems operate) for use by competing technologies within the band. The ability of ETC systems to operate with full functionality as they were originally designed would have been compromised. In addition, the proposed rule allowed only three years for conversion to the proposed new frequency

allocations. The IAG has been active in its opposition to the NPRM both in its support of IBTTA's activities in this regard and through its own submittal of comments and reply comments as the FCC's rule making process has played out. Clearly the timing and uncertainty of the FCC's action have been a major cause of concern to the IAG. We propose to invest millions of dollars in an innovative and landmark example of regional cooperation to resolve transportation issues, but even today have no assurance of our ability and that of the motoring public to fully realize the fruits of our investment. Indeed, the federal government itself has committed some $40 million to our effort and will see its own investment in jeopardy if the FCC's final action should compromise the IAG's ability to operate in the short or mid term. The IAG recognizes the need to resolve the issues surrounding the crowded 902-928 MHz band, but suggests that such issues as protection of public investment, retention of the ability to operate systems in place or in the implementation process and provision of sufficient time for industry to catch up with regulatory changes should receive as much focus during the rule making process as the technical and competing commercial issues which seemingly have been the primary focus to date. The continued uncertainty surrounding the FCC's intentions has caused at least one toll agency in the country to announce the suspension of its ETC activities until the FCC acts. And others may also be freezing their programs pending the

outcome. Clearly, the public benefit from transportation agencies' use of the spectrum needs to be given proper consideration.

- Intelligent Vehicle Highway Systems (IVHS) are a fairly recent phenomenon, at least as far as federal funding issues are concerned. Funding for transportation projects traditionally has flowed through the Federal Highway Administration for construction and rehabilitation projects. The procedures of the FHWA, and indeed the State Departments of Transportation which benefit from the funding, are clearly geared toward those construction and rehabilitation projects. IVHS projects, including ETC, have their own unique characteristics and, typically, the principals managing those projects are not well steeped in the traditional policies and procedures of the funding bureaucracy into which IVHS projects are being force fit. We believe that we need to work toward recognition that technology projects, including operational test and research and development efforts, need to have funding procedures and requirements which are relevant and tailored to their need. We believe the FHWA also recognizes this need and, that as more and more IVHS projects are brought to the table, the FHWA will rise to the challenge.

- As the IAG negotiated contracts with the two finalist vendors, certain issues related to federal funding surfaced which caused them concern, and to varying degrees, hampered the negotiations. One involved FAR accounting requirements.

FAR - Federal Acquisition Regulation - is undoubtedly old hat to companies used to doing business with the Federal Government or its funding recipients. But, it may well be an area of mystery and foreboding to the many high tech companies now coming on the scene in the IVHS arena and could constitute part of their thinking on whether or not to compete. Perhaps more onerous is the usual federal funding requirement that developed products be placed in the public domain. Technology companies willing to undertake the R&D expense for new products or development costs for new software expect future profit from their investment. Granted the development costs may be covered in whole or part by the fee the company receives for its work. But, in our opinion, there is not the incentive to create and excel in a one shot project that might be found in an effort that has more substantive impact on the future financial health of a company. This strikes us as an area where a middle ground might be healthy and profitable for both sides.

- As noted previously, there currently does not exist any national standard for electronic toll collection, nor indeed for IVHS technologies generally. Recent efforts by IVHS America's Standards and Protocols Committee are moving steadily in the right direction with the support of the FHWA and the active involvement of the user community. Eventual adoption of national standards will assure attainment of the critical need of national interoperability for ETC and other

IVHS technologies. But, let's not forget that we already have some substantial public and private investment in systems already or about to be deployed. We need to assure, as we set standards for the future, that we do not adversely affect the ability of agencies or regional systems like E-ZPass to derive the full benefit of the normal life expectancy of the installed systems into which financial and other resources have been so heavily invested. Certainly, we should move with dispatch to adopt standards so that they are available in the near term for those just embarking on IVHS initiatives. But, we must remain flexible and realistic in terms of when we expect conversion of existing systems.

We of the E-ZPass Interagency Group feel a good deal of pride and satisfaction in what we have accomplished to date. Clearly, there have been substantial roadblocks for us to overcome, but we have met the challenge and we are now postured to begin operating what may well be the largest electronic toll collection system in the world and the only one, at least in this country, that covers a large, multi-jurisdictional region. What might the future actually bring for us?

- While we have put in place a strategy to operate a single tag system in the region, our customers will be faced with the need to open and maintain accounts with each individual agency. Clearly this is not in their interest nor ours, but our first effort to obtain sufficient proposals for

a regional "clearinghouse" was unsuccessful. We expect to try again in the not too distant future. Not only is the single tag/single account concept logical - it is inevitable that our customers will demand it.

• My agency - the New York Thruway - is currently operating a 70,000 tag interim read-only ETC system implemented while the IAG read-write procurement was underway. TRANSCOM, a coalition of fifteen transportation and traffic agencies in the same region as E-ZPass (and represented here today by Matt Edelman) is conducting an operational traffic management test, TRANSMIT, funded by the FHWA. The Thruway's interim E-ZPass customers' tags are used as anonymous probes on the highway system. Through a system of readers/antennas and dynamic software, travel times and speeds can be compared against norms to detect incidents. When the E-ZPass system is completely built out in the region, the eventual expansion of TRANSMIT has the potential for providing up to the minute incident detection throughout the region limited only to the extent the we are willing to invest in the roadside equipment. TRANSMIT is evidence that one of the concepts of tomorrow - utilizing electronic toll technology as a backbone for other IVHS initiatives - is actually here and viable today.

• The implementation of E-ZPass throughout the New York, New Jersey, Pennsylvania region is part of a proliferation of electronic toll collection through the country. Systems are already operating in Texas, Louisiana, California and

Oklahoma. Other States, Kansas and Massachusetts for example, are moving in the same direction. The E-ZPass Group has a vision for the future shared by many in the toll industry - the eventual seamless movement of passenger cars and commercial vehicles on the nation's toll highways with minimal/or no delays in toll plazas and maximum convenience for the toll payers through the utilization of common accounts.

- E-ZPass, TRANSCOM and the I-95 Corridor Coalition are prime examples of transportation technology initiatives that can be undertaken successfully on a regional or coalition basis with results and impact that agencies could not realize individually. Lessons learned from E-ZPass in such areas as organization, process, technology evaluation and relations with other entities including the vendor community and the Federal government will serve the member agencies well in the future as they begin to address new challenges together or in other coalitions with various transportation agencies.

The E-ZPass Interagency Group appreciates the opportunity to be represented here today and to share its insights with you. We invite and encourage you to visit us in the northeast as our system is deployed, or sooner if we can be of any assistance to you in the work of your committee. I would like to leave you with the words of one of my E-ZPass colleagues who, in responding to a reporter's inquiry about the purpose of E-ZPass, said simply, "We are trying to take the toll out of paying the toll." Thank you.

ADDITION TO THE RECORD

TESTIMONY OF
VICE MAYOR JOHN BUTT
CITY OF CHESAPEAKE, VIRGINIA
ON BEHALF OF THE
NATIONAL LEAGUE OF CITIES
BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
U.S. HOUSE OF REPRESENTATIVES
HEARING ON
INTELLIGENT VEHICLE HIGHWAY SYSTEMS
JUNE 29, 1994

Mr. Chairman and members of the Committee, my name is John Butt, Vice Mayor of the City of Chesapeake, Virginia and I am presenting testimony on behalf of the National League of Cities. I am very pleased to have an opportunity to speak to you about local governments and Intelligent Vehicle Highway Systems (IVHS).

Local governments recognize the importance of new technologies such as IVHS. The benefits of IVHS are ones that all local government officials wish to deliver: improved safety, reduced congestion and travel demand, and enhanced air quality and economic development. IVHS presents cities and towns with new challenges and opportunities, both for partnerships with the private sector, and for a coordinated, regional approach to intermodal transportation management.

The Intermodal Surface Transportation and Efficiency Act (ISTEA) provides funding for research into IVHS. The U.S. Department of Transportation has made a firm commitment to work with local and state governments, as well as industry, universities and

international organizations to develop IVHS traffic management systems.

Local governments have been identified as key participants in IVHS. Most roadways and public transit systems are owned and operated by local governments. As pointed out in the U.S. Department of Transportation's strategic plan, state and local governments will dictate the selection, purchasing, installation, ownership, operation and maintenance of IVHS infrastructure. Local governments will have to deal with a myriad of issues related to IVHS implementation, such as:

- -Cost and effectiveness of the technology;
- -Compatibility of IVHS with safety, environmental, land use, economic development and quality of life issues in our local communities;
- -Cooperation and coordination between all stakeholders;
- -Education of the public and user behavior;
- -Financing, pricing and taxation;
- -Liability;
- -Standard and protocols
- -Intellectual property rights
- -New procurement models and innovative public-private partnerships to deploy IVHS.

The National League of Cities' Transportation and Communication Committee has policy-making and legislative jurisdiction over IVHS within the organization. At prior policy meetings,

Transportation and Communications members discussed the implications of IVHS and came to the following conclusions.

The federal government, with the Department of Transportation as the lead agency, has a vital role as a catalyst to expedite the development of IVHS and we welcome the opportunity to act as full partners in this program.

It is important, however, that our transportation requirements and priorities be carefully identified along with those of federal and state authorities. We, as local elected officials, represent the traveling public and are directly responsible for maintaining much of the transportation infrastructure. We are certainly one of the primary customers of IVHS and as the private sector would say, it is essential that this program stay close to the customer.

The last point I would like to make, Mr. Chairman, is one of funding. Funding will allow IVHS to be a priority. Although the IVHS program is not a federal mandate, the responsibilities of implementing a successful program, as I have noted earlier falls on the shoulders of local government.

IVHS will require a substantial infrastructure investment and a continuing operational effort. It is therefore paramount that adequate funds be appropriated for meeting the IVHS objectives.

I also need to note that there is still a substantial un-met need of maintaining what we currently have in the way of roads, streets, and transit infrastructure. These systems will continue to be the backbone of surface transportation mobility, and IVHS will in fact enhance this system, but with limited and declining dollars and without additional funds, local governments will not place a high priority on IVHS technology. The choices with these limited funds will be: filling pot holes, installing stop signs, meeting ADA requirements, and addressing environmental concerns, and not IVHS.

In summary, Mr. Chairman, despite my last point, cities do look forward to working with the Federal government and private sector in a coordinated national approach that will ensure successful IVHS deployments in the years to come.

Thank you, Mr. Chairman.

INTELLIGENT VEHICLE-HIGHWAY SYSTEMS (IVHS)

THURSDAY, JULY 21, 1994

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2167, Rayburn House Office Building, Hon. Robert A. Borski (chairman of the subcommittee) presiding.

Mr. BORSKI. The subcommittee will come to order.

The subcommittee today will hear the second day of testimony on the application of advanced technology to our transportation systems, known as intelligent vehicle highway systems, or more accurately, intelligent transportation systems. Advanced technologies represent the wave of the future in transportation. We must redesign our transportation system to take full advantage of the new technologies that will allow us to move people and goods more efficiently.

The ability to improve our transportation system throughout use of advanced technology is virtually limitless. But there are serious questions that must be addressed.

Where will we find the funds to deploy and operate advanced traffic management systems in the metropolitan areas?

Are metropolitan planning organizations considering the need for intelligent transportation systems when preparing their priority list for funding?

How will the Nation's transit systems use these technologies to provide better services to their riders?

Will we develop a system that will result in a compatibility of electronic toll collection systems?

These questions must be addressed if we are to develop a truly efficient transportation system that will provide for the better use of roads and transit systems in the metropolitan areas.

There is no question that advanced technologies will be used. However, we must provide leadership at the national level.

This morning we are pleased to have Mr. Linton and Mr. Slater, who are providing leadership in this area, and many others. I want to congratulate you both on the cooperative spirit we have seen from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) during the last year and a half.

I now recognize the distinguished Ranking Member, the gentleman from Oklahoma.

Mr. INHOFE. Thank you, Mr. Chairman.

First let me just echo the complimentary remarks you make about Mr. Slater and Mr. Linton. It is a pleasure to have them here today.

Most people envision Buck Rogers-type applications when they hear about intelligence vehicles. While in many respects this is true, it is important to recognize that the IVHS has many practical applications. We learned in our first hearing on IVHS technology three weeks ago that application of current IVHS technology ranges from ramp metering to busy interchanges to correctly replaying information on commercial vehicle operations.

Mr. Slater, you are probably aware that my State of Oklahoma is one of the first successful applications of the automated toll payments. It has worked very well.

Today we will hear what the administration is doing to promote IVHS and how individuals in States are applying it.

As always, I look forward to the committee hearing.

Mr. BORSKI. The Chair thanks the distinguished gentleman.

We would like to welcome our first panel this morning, Mr. Rodney Slater, Administrator, Federal Highway Administration, and Mr. Gordon J. Linton, Administrator, Federal Transit Administration.

[Witnesses sworn.]

Mr. BORSKI. Thank you very much.

Let me remind our two very distinguished guests that your full testimony will be made a part of the record and you may proceed in any way in which you feel comfortable.

TESTIMONY OF RODNEY E. SLATER, FEDERAL HIGHWAY ADMINISTRATOR; AND GORDON J. LINTON, ADMINISTRATOR, FEDERAL TRANSIT ADMINISTRATION, DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY DR. CHRISTINE JOHNSON, DIRECTOR-DESIGNATE OF THE JOINT IVHS PROGRAM OFFICE

Mr. SLATER. Thank you.

Mr. Chairman, I am pleased to join my colleague, Federal Transit Administrator Gordon Linton, in appearing before this committee today to represent the Department of Transportation at this hearing. I commend you and the committee, Congressman Inhofe, and other Members of the committee, for scheduling this hearing that we might discuss what truly will be one of the important aspects of our transportation system as we prepare for the 21st Century.

As you noted, our full text, the full text of our remarks will be submitted for the record. So we would then just summarize our comments. That way we might soon begin the process of engaging in substantive dialogue on the issues to be addressed today.

I personally am excited about the Intelligent Vehicle-Highway Systems Program, or intelligent transportation systems, as you have noted, is a more appropriate name for the program. It represents the beginning of the use of technology and a way to enhance our system in ways we can only dream of today. But as has been noted, we do have significant examples of the use already.

But clearly when we utilize it over the broad spectrum of our transportation modes, it truly represents a concept that we can

only dream of today. It will provide greater efficiency for our system. It will enhance the system in ways that are yet unknown.

As the U.S. surface transportation system and policies evolve from merely constructing new facilities to more effective operation and maintenance of our existing facilities, we envision that IVHS technologies will play a significant role, particularly on the new national highway system called for by the Intermodal Surface Transportation Efficiency Act of 1991.

I would also like to commend the committee and the entire House of Representatives for the timely passage of the bill designating the national highway system, and for your strong support of the development of a national transportation system to be submitted to the Congress within two years after the passage of the national highway system. Both the national highway system and the national transportation system will play critical roles in our transportation future.

We would also like to note that we believe that the national highway system will serve as the backbone of our national transportation system.

I am pleased to have with me today and with Mr. Linton Dr. Christine Johnson, the Director-designate of the department's new joint IVHS program office. Dr. Johnson brings with her a wealth of experience in the transportation field, in both the public and private sectors. This experience will be invaluable to us as we seek to strengthen the connection between the public and private sectors that we might make IVHS technology a reality across the broad spectrum of our transportation system.

Dr. Johnson served as Assistant Commissioner of Policy and Planning in the New Jersey Department of Transportation, and most recently served in a high-ranking position in the private sector. She has also served on the board of directors of IVHS AMERICA.

Both of you know that President Clinton and Secretary of Transportation Pena share a strong commitment in harnessing technology to improve our transportation system. They believe, as do we, that transportation must play a key role in our Nation's long-term sustained economic growth. One of the department's highest priorities is to help spur economic development through the strategic investment in transportation.

To this end, the administration has proposed to increase the funding for FHA's IVHS program and our entire IVHS program. More specifically as relates to FHWA's program, the proposal asks for $165.8 million, thus an 83 percent increase over the fiscal year 1994 level of $90.3 million.

We are also working to ensure that our investments improve daily life by making travel safer and more convenient and more human. Furthermore, we seek to ensure that transportation investments are made in ways that assist our economic efforts as well.

Finally, and perhaps more importantly, we are working to integrate all modes of transportation into an intermodal system for moving goods and people. The application of IVHS technologies will be crucial in the creation of this truly national transportation system, an intermodal system, one that takes advantage of the strengths of all of our transportation modes.

I recently had the opportunity to travel across America, Mr. Chairman. I think we have talked about this before. It was a trip that took me over 3500 miles, through 14 States, and it lasted 14 days. During the course of this trip, not only did I have the opportunity to travel on the proposed national highway system, but I had the opportunity to talk to people about the importance of transportation to our economy and to our quality of life.

I had also the opportunity to hear them speak of their dreams and hopes and aspirations for their community and to talk about the importance of transportation to the realization of those dreams, hopes and aspirations.

But we also had the opportunity to look at how IVHS technology is being used to enhance our transportation system. One of the ways that we saw it in action was at the Michigan Intelligent Technology Systems Center, which is the Michigan Department of Transportation IVHS research and development and deployment hub.

There we observed truly state of the art monitoring facilities, which included remote cameras, changeable message signs, controls of all sorts, and computer-generated displays of traffic conditions on the freeway. In a nutshell, we saw IVHS technology in action.

Also, as another part of the trip through Michigan, we visited the Henry Ford Museum which houses not only the first automobiles ever built, but also a replica of the lunar rover used by the astronauts 25 years ago to explore the moon.

I might add that it is fitting that we hold this hearing today, one day after we celebrated the 25th anniversary of Apollo 11's epic landing, for this program accelerated the development of many of the kinds of technology being used today as we employ and move forth with this IVHS program.

Today, as we develop and implement IVHS, we are in a fortunate position, the position of having a sound and robust technology base on which to build. During confirmation hearings, I also indicated that harnessing technology would be essential if we are to increase the efficiency of our transportation system, and that if highways are to be a mode of transportation for the future, this would be essential as relates to the Federal Highway Administration and to highways as a whole.

I believed that then, I believe it even more today. By harnessing these tremendous opportunities, we have the technologies to enhance our system. We can greatly increase efficiency and safety as relates to our transportation system, and thus increase our economy at the same time.

The IVHS program, in a nutshell, is a private-public partnership in all respects. Using the resources provided by Congress, the department has moved forth expeditiously and in an aggressive manner to establish partnerships that will allow us to make our IVHS initiative productive. We have established a national IVHS program that is second to none.

This national program will meet the goals and objectives established by ISTEA, which includes the Intelligent Vehicle-Highway Systems Act of 1991.

Let me underscore just some of the accomplishments we have achieved to date. We have initiated an extremely effective alliance

with many diverse private and public sector organizations which have a stake in the IVHS program. Thus they have something to gain and are willing to make a contribution.

We are also successfully fostering cooperation among the department's modal agencies, as well as the establishment of an overall IVHS program management program.

The new joint IVHS office, to be headed by Dr. Johnson, will truly be intermodal. It will include individuals representing the Federal Transit Administration, the National Highway Traffic Safety Administration, as well as individuals coming from the ranks of the Federal Highway Administration.

The joint office program will serve as the department's executive agent for the management and oversight of the department's intermodal IVHS program, policy development and budget. And I know, Mr. Chairman, this is an important concern for you, because of your desire in particular to see more emphasis on how IVHS technologies can be used to enhance our transit system.

We are also currently participating with the Federal Transit Administration and the National Highway Traffic Safety Administration as well as the Research and Special Programs Administration in numerous research projects and operational tests which feature safety and intermodal applications in the development of IVHS technologies for user services and other IVHS-related activities.

We have initiated efforts to learn more about critical IVHS institutional, technical and program delivery issues. Also with our partners, we have completed the second draft of a comprehensive national IVHS program plan that outlines activities needed to reach deployment of a full range of interrelated IVHS user services.

We have sparked considerable private and public sector interest and involvement in the national IVHS program, including national laboratories and defense-oriented companies.

Let me underscore a few points about the key role of the private-public sector partnerships and how that relates to the success of our IVHS effort. Implementing a nationally compatible system of IVHS technologies and services within the United States will depend on unprecedented levels of cooperation and coordination between the public and private sectors. Private sector participation in our program ranges from consultant support to full responsibility for designing, building, operating and maintaining IVHS systems.

In addition, the private sector will develop and sell the many products and services that the IVHS program will spawn.

A couple of examples that underscore how successful we are in this effort is, one, the I–95 Corridor Coalition, which is demonstrating how technology can be applied to the NHS.

The I–95 Northeast corridor involves intermodal movements of both people and goods. It involves toll authorities and a whole host of transportation modes, services and facilities. An important aspect of the coalition's work and an important model for others is that the projects that are being developed are integrated into the ongoing metropolitan and Statewide planning process. Therefore, we are getting local support and involvement in the decision-making process.

I might also add that the I–95 corridor runs through districts and States represented by many of the members of this organization.

In this age of global competition, this public and private sector partnership that we are promoting permeates all of our program activities and will serve as a key to the success of the overall program. Everyone wonders how our IVHS program activities compare to similar efforts in Japan and Europe. Let me say, Mr. Chairman, that we believe we are competing very well.

Many of our activities go beyond what is occurring in Europe and Japan. And while the Japanese may have some advantage when it comes to deployment, we believe the foundation we are setting will be more comprehensive and will allow us to make larger steps in a more expeditious fashion.

Let me give you a few examples. Unlike the Europeans and Japanese, the United States program has placed considerable emphasis on organization, planning, evaluation, and a focused approach on developing a national IVHS architecture, while simultaneously carrying out extensive research and operational field tests. All of these efforts have been advanced in a true partnership form between the public and private sectors.

As a result of this strategy, as well as strong congressional support, the U.S. IVHS program rivals our foreign competitors in many respects but also leads them in many others.

We have already made many strides in the deployment of IVHS technology, as Congressman Inhofe noted, in his own home State of Oklahoma. By maintaining our strategic focus, we stand poised to put in place a truly national IVHS infrastructure that will allow us to lead the transportation world into the 21st Century.

One particular area where we feel most confident is in the area of commercial vehicle operations. And when we consider how many of our goods are moved throughout the United States and how we hope to move them beyond our borders with the advent of the NAFTA and GATT agreement, commercial vehicle operations will play an important role in that regard.

The Secretary has committed the department to use advanced technologies to increase the safety and productivity of our motor carrier industry. Vital safety and regulatory checks would be made automatically and electronically, eliminating delays and also allowing us to enhance our environment at the same time.

Truck and bus fleets would be able to purchase credentials electronically. This standard nationally uniform credential data bank, along with safety, tax and registration information, would be accessible nationwide so that complaint vehicles would not have to stop at intersection facilities.

And it is estimated by the American Trucking Association that for every minute that a truck is at an inspection facility, there is a dollar lost in productivity because of that delay. That doesn't even take into account the damage to the environment that results from trucks sitting and idling.

IVHS partnerships will also be closely tied to commercial vehicle operations in many other ways. The health Help Crescent operational tests of commercial vehicle services along the West Coast is but one example. This effort has led to the establishment of a

not-for-profit company called Help, Inc., which is encouraging the use of IVHS technology as it relates to commercial vehicles.

A couple of comments about the IVHS system architecture, IVHS standards, and then I will close, Mr. Chairman.

The department is spearheading a program to develop an open IVHS architecture. This will be a framework that describes how system components work together to achieve total systems goals. We are moving along very well with the development of this architecture. It will be open and therefore permit flexibility and innovation.

As relates to IVHS standards, and I know we will probably get into this a bit more with questions, there is a clear, recognized relationship between architecture definition and standards development. The department is closely coordinating these critical program elements. In fact, a specific position is being established in the new IVHS Joint Office dealing with IVHS standards development.

While there have been comments about how we can use IVHS technology to deal with present and current, recognizable transportation needs, we should not lose sight that this technology will also allow us to develop an automated highway system. We have a commitment to demonstrate to the Congress by 1997 a prototype of this system. We are on track to doing and being able to do just that.

We believe that this system, to be employed and utilized where appropriate, will help us to reduce human error significantly, and that the automated highway system could prove to be a nearly accident-free driving experience.

All of these technologies will allow to us make the national highway system something that is more than just concrete asphalt and steel. It will allow us to bring to bear on this system electronic toll collection systems, as are evidenced and in operation now in Pennsylvania, Ohio, Texas, Michigan, New York, and planned in California and Virginia.

It will allow us to take benefit of the smart corridor investments that we have made along the Santa Monica freeway and utilize those in other areas of the country.

It will allow us, in a nutshell, Mr. Chairman, to make our system a system of the 21st Century, to allow us to remain competitive economically and to allow us to continue to make those improvements that bring benefit and enhancement to our quality of life.

We look forward to answering questions that you may have about the program, and at this time I am sure that Mr. Linton would have some particular comments to make about how important this program is to the transit system as well.

Mr. BORSKI. Unfortunately we have been called to the Floor of the House for a vote. If any Members desire to make opening statements——

Ms. COLLINS. I have one for the record.

[The prepared statement of Ms. Collins follows:]

Prepared Statement of Congresswoman Barbara-Rose Collins

Thank you, Mr. Chairman, for holding this hearing on IVHS. IVHS is the future of transportation. It holds the key to saving thousands of lives, millions of wasted hours, and billions of dollars.

Michigan and Detroit are proud to be a part of one of the earliest IVHS efforts. Predating the Intermodal Surface Transportation Efficiency Act, the Advantage I–75 corridor project envisions a single integrated industrial corridor spanning the U.S.-Canadian border by running from Toronto to Miami.

Currently, this project is focused on allowing trucks to operate as disruption-free as possible on this corridor. By integrating weight-in-motion truck scales with electronic sensors and transponders, trucks are able to move from station to station without stopping at weigh or inspection stations.

Today Advantage I–75 is well on its way to achieving its goal, even without Department of Transportation designation as an IVHS High Priority Corridor under ISTEA.

In light of this, it seems logical that FHwA should continue to support Advantage I–75. FHwA can learn a great deal about IVHS from the I–75 experience. More imporantly, however, completion of Advantage I–75 will require FHwA coordination with the Customs Service in order to ensure compatible architecture for the envisioned electronic customs clearance system at border crossings in Detroit.

I am excited about the potential of IVHS. As Advantage I–75 has shown, IVHS has substantial applications today, and has great potentail for the future. I look forward to the testimony of today's witnesses.

Thank you, Mr. Chairman.

Mr. Borski. Mr. Linton, let me ask you, if you will, if we can recess for a few moments and then come back to accept your testimony.

Mr. Linton. Fine, Mr. Chairman.

[Recess.]

Mr. Borski. The subcommittee will reconvene.

We will now hear from the distinguished gentleman from the City of Philadelphia, the Federal Transit Administrator, Mr. Linton.

Mr. Linton. Thank you, Mr. Chairman, Members of the committee. I am pleased to have this opportunity to appear before you and the committee today, and to join with my colleague and partner, Rodney Slater, the Administrator of the Federal Highway Administration.

I wish to discuss the Federal Transit Administration's role in the challenging intermodal IVHS effort. Since the promising new technologies we are discussing this morning can be applied to all modes of surface transportation and not just to highway vehicles, for the purpose of my testimony I will use the term ITS, intelligent transportation systems, in describing them. I think that the term ITS is much more descriptive than IVHS, and also is one less letter for me to pronounce.

In furtherance of the policies of the Intermodal Surface Transportation Efficiency Act of 1991, we are working with the Federal Highway Administration and other elements of the Department to establish a truly multi-modal transportation system, and we believe that the Department's ITS initiative will play a critical role in that effort. Just as these advanced communications and information system technologies have begun to bring about efficiencies in the private sector, so too, will they have similar impacts on the delivery of transportation services in the public sector.

As you know, Mr. Chairman, automobile congestion has been increasing despite a variety of efforts to turn this trend around. Communities are struggling to develop transportation systems that provide access and mobility and minimize pollution and congestion. Now, however, public transit participation in the national ITS program offers a real opportunity for our local communities to develop the means to improve transit's flexibility and convenience, thereby increasing transit's use.

Intelligent transportation systems offer a variety of new tools to local communities and planners and new ways to improve access and mobility. ITS technology offers public transportation the opportunity to improve significantly customer service and convenience.

While ITS should enable transit providers to attract new riders from their automobiles, just as important is what these new technologies offer our core customers, those without the automobile option. Improved customer information and more user friendly transit will help everyone and will be particularly useful to those with physical limitations.

Mr. Chairman, I think mass transit is an ideal way to introduce a large segment of the American public to smart technologies and how they can help meet our Nation's transportation challenges. We are already beginning that process, which I will discuss shortly. In addition, as industries shift from defense to other applications, these transit-related technologies present new opportunities for investment.

I would like to describe for you some real examples of where FTA is helping ITS become operational in the transit industry. Let me note that we are doing this through FTA's advanced public transportation systems or APTS program. APTS was established to focus all of our transit activities on support of the national ITS initiative.

I will begin with travel information systems which have great potential to improve customer service and convenience. The Los Angeles Metropolitan Transportation Authority is installing information kiosks that allow customers simply to touch a screen to select information on the most convenient form of transportation, from a transit bus to finding a group of people to ride share for a particular trip.

The customer may also get a printout of the information. The system is even tied into a statewide health care information kiosk network and may offer further opportunities for interagency cooperation and efficiency.

Let me emphasize here, Mr. Chairman, the importance that ITS activities play in the area of fare and automobile toll collection with the ultimate goal of a universal multi-modal fare and toll collection system. The fare-cards we use for the Metro Rail in Washington are only the first generation of what promises to be a useful tool. The Washington Metropolitan Transit Authority is testing a smart card system that remotely reads and debits the cards through radio waves. The card never leaves the customer's hand.

Mr. Chairman, I have here some of the smart cards that are being used. One is the smart travel card that is being used in Los Angeles, this is also a proximity card, just as is the one that is being proposed for use here by WMATA for the Washington metro-

politan area. I will leave that here for you and the other Members of the Committee if you would like to see what it looks like.

Future cards may be solid plastic with a microchip. They could also be integrated with multiple transit operators and electronic toll collection systems, thereby providing a single payment medium for all transportation in the area.

Other fare innovations are occurring in Ann Arbor, Michigan, where they are implementing a system that will combine both bus fare and parking. Prices will be structured to encourage the use of transit and other incentives for drivers to take transit at least one or two days a week will be initiated.

An especially exciting aspect of the intermodal ITS effort is the opportunity to make transit an attractive alternative to the automobile. I am particularly interested in the potential of coordinating transit operation with traffic management and involving transit management in transportation management. By enabling traffic operation centers to emphasize the efficient movement of people instead of vehicles, ITS should increase the convenience of transit and increase the efficiency of the overall transportation system as well.

For example, in Chicago, buses along a major route will be tracked to determine when it will be useful to alter traffic signals to restore consistent intervals between buses and return them to schedule.

In Baltimore, the Maryland Mass Transit Administration has been operating an automatic vehicle location system installed on 50 buses, which are controlled through two computer consoles with digital map displays. The system uses a geographical information system to display actual bus locations, contrasted with scheduled locations.

Once the location of a bus is electronically transmitted to the dispatcher, two-way radio communication enables corrective action for off-schedule buses.

Eventually the system will expand to include all 900 Baltimore transit buses, and GPS, global positioning systems, will be used to track the vehicles. The displays are already being used in Denver, Milwaukee and Dallas.

The Metropolitan Transit Authority in Houston, Texas, is ready to launch a test of a real-time traffic and transit information systems with continuous updates on traffic and transit conditions, bus choices, and car pool options to travelers both at home and at work.

Another example of innovative technology application is in the Seattle and Bellevue, Washington, areas, which are using a computerized information center to allow people to match up with car pools and van pools. Participants carry electronic pagers to make ride sharing easy and versatile. We have learned that 42 percent of driver-commuters will consider the ride sharing made possible by such a system.

A rider's daily commute may soon begin by logging on to a home computer. One program will determine if any members of the car pool are out sick. Another will check for car poolers in that area.

Ride-sharing groups using high occupancy lanes are finding such information invaluable. They can find an immediate replacement when a regular rider is out sick and continue to use the HOV

lanes. The system is also useful for people who occasionally need to catch a ride.

As these examples show, smart technology is not only a highway or even a transit issue. Its success will depend on a coordinated effort involving all modes of transportation in better serving the travel needs of the American public.

These examples, with new ones coming every day, barely scratch the surface of the dozens of exciting technological advances that are being researched, tested, and demonstrated as they move towards widespread use in our Nation's mass transit programs.

Mr. Chairman, let me now discuss additional activities that the FTA has undertaken in this area. I have just described our APTS program, which I noted earlier is a component of the Department's ITS program. FTA is also involved in a number of programs to bring about the testing, application and employment of ITS. The focus of our activities is the transit riders, our customers, and what we can do to better serve their travel needs.

Through the APTS program, FTA will ensure that transit related, environmentally friendly ITS systems will be widely implemented beyond operational test stages. Results of the operational tests and evaluations of the new technologies will be shared with such groups as transit operators, MPOs, and communities For these new technologies to reach their potential to improve transit, they must first be considered in the local planning process, leading to investment decisions based on the content of the transportation improvement plan.

Accordingly, the APTS operational test evaluation focuses on those issues important to local communities. We assure that evaluations address the capability of the technology application to address transit problems, increase ridership, reduce congestion and improve air quality. Hard data on benefits, performance and reliability are also needed.

Mr. Chairman, you and I have been through these tough resource allocation decisions and know the need for such useful and practical information. To conduct the necessary evaluation, FTA is using the Volpe National Transportation Systems Center to ensure that evaluations are performed in a consistent, standard manner. To date, the Volpe center has demonstrated a set of evaluation guidelines and has put together an evaluation team, which has begun to develop specific site evaluations.

To further get the word out to the transit community about ITS, FTA, through the APTS program, is putting transit operators interested in ITS in touch with key professionals involved in the operational tests. Networking among peers has been found to be one of the major mechanisms for transferring new ideas. We are facilitating a process where professionals involved with the APTS operational tests may give their peers the results of their firsthand experience.

As MPOs and states work to develop efficient transportation systems, the greater funding flexibility provided by ISTEA offers the opportunity to develop more comprehensive programs and projects, such as joint FTA–FHWA multimodal ITS systems. By providing states and local transportation authorities the financial capacity and programming flexibility to support efficient and environ-

mentally sound transportation projects, ISTEA provides the basis that will enable transit ITS to be deployed.

Let me conclude my testimony by reiterating that ITS technology applications are going to be found to positively affect local transportation problems. FTA's efforts are focused on providing local policymakers and professionals with reliable information on ITS to help them select the best technology for their particular needs as they make critical investment decisions.

Mr. Chairman, I thank you and the Members of the Committee for providing me with the opportunity to provide you with FTA's perspective on IVHS–ITS technology.

Let me also, Mr. Chairman, provide for you and Mr. Inhofe copies of the Federal Transit Administration's new strategic plan, which we just announced and rolled out yesterday, that complements the Department's strategic plan. I will note, Mr. Chairman, that in our strategic plan we make specific reference to the use of IVHS–ITS technology in providing customer friendly technology to make our transit properties around the country much more customer friendly.

We also make note of our efforts to provide for the assimilation of this information so that MPOs, transit providers, and others around the country can use this technology to better serve the American public.

The information in both those action objectives is listed in our vision strategies for our new strategic plan. I hope you find some interest in reading it. We will have copies available for other Members of Congress as well.

Mr. BORSKI. Thank you very much.

Mr. Linton and Mr. Slater, you made some excellent points in your testimony. One point you both made is something that I have been advocating for some time. That is your reference to the use of the intelligent transportation system, or ITS. I believe it is a more inclusive term, and clearly reflects the intermodal aspects of the program.

Is there any movement within DOT to change the name to intelligent transportation systems?

Mr. SLATER. First, Mr. Chairman, it is good to hear you as a Member of Congress underscore the importance of this consideration, because it was Congress that really gave the term IVHS to the program.

Clearly, the Secretary, as well as Gordon and myself and other members of the Department of Transportation, recognize that this is the kind of technology that to be fully beneficial to the American public must move beyond any given mode to encompass all of the modes of transportation. That is an end to which we are committed. Secretary Peña at a recent meeting of IVHS AMERICA, urged that organization consider this kind of change in the name of the program. IVHS AMERICA will have its board meeting in the next couple of days—at the end of the month, to be exact—and this issue will be on the agenda.

Gordon and I will be attending, along with Deputy Secretary Mort Downey, as members of the board, and we will clearly voice our support for such a change.

Mr. BORSKI. Mr. Linton and Mr. Slater, many of the its ITS systems of application should be deployed in metropolitan organizations. What are FTA and FHWA doing to get MPOs to include ITS systems in their planning and programming processes? Are you making them aware that the projects have to be included on their priority list to be eligible for funding?

Mr. LINTON. Let me respond, Mr. Chairman, by stating that we are in the process of doing quite a bit of testing applications, as well as research and some demonstration projects. What we are hoping to do is provide both the information and the testing that the MPOs and others need to make those decisions.

Generally individuals do not want to go forth with the implementation of a new technology until all of the questions regarding its application can be answered. So we are hoping through both our research, our demonstration projects, and the tests that are being conducted that we can provide that.

I will also note that in those communities, where in fact there is active use of MTS technology, those NPOs are engaged in those discussions and also discussions that lead to the deployment of those technologies in their communities. It is clear that ISTEA has asked the MPOs which develop the Statewide Transportation Improvement Program (STIPs) to maximize both the flexibility and the opportunities for efficiencies that ISTEA offers by using this technology.

So we are both making the information available, providing the testing that is necessary, and working with those MPOs in the areas where the technology is now being deployed and tested.

Mr. SLATER. I would just add, Mr. Chairman, Congresswoman Molinari, and Congresswoman Collins, that we are encouraging the MPOs through the Statewide planning process, to really move forth aggressively in ensuring that these kinds of issues are on the table for discussion, and we think that, along with the operational tests and the other activities in which we are engaged, will result in more and more resources being devoted to this kind of activity.

I would also hasten to add, though, that because many communities and States are faced with transportation systems that are really falling apart because of a lack of investment over the last years, that some of those issues are proving to be more of a primary concern, priority concern.

But we have seen an increase in the amount of resources over the last few years being devoted to the use of IVHS technologies. And we are very pleased with that.

Mr. BORSKI. Mr. Linton, in our first day of hearings GAO reported that in fiscal year 1992 and 1993, about 9 percent of the IVHS programs' expenditures have supported the development of IVHS technologies that enhance the convenience and accessibility of public transportation systems. What specific actions do you plan to ensure that more than 9 percent of Federal funding is allocated for transit?

Mr. LINTON. Mr. Chairman, let me say that we are working actively, as a member of the joint IVHS office that has been established in the Department, and as you see today, working with Rodney Slater. You can see by our presence here that we work well together. I think that in the joint IVHS office that we are establish-

ing—our Director has been identified to you and the other Members of the Committee this morning—we anticipate that we will be moving towards increasing the application and the availability of those funds for transit uses as well.

I also would like to mention that many of the dual-use technologies projects, a significant number of which have been selected, have been transit related. We see some real opportunities there as well for some of the defense technology funds being set aside that will be used towards assisting us in getting ITS technology in the transit area as well. So we think there is a major opportunity to make some major improvements in that area.

Mr. BORSKI. Mr. Slater, you touched on this in your previous response. How do we get cities to participate in the placement of advanced traffic management systems when there are so many competing demands on city budgets for funding for things like infrastructure, education, police, sanitation, so on?

Mr. SLATER. I acknowledge the task is going to be a difficult one. Any time you have limited resources, you have hard choices. In this administration you had to decide how the Federal budget would be divvied up. But just as it occurred at this level where there was a recognition of the importance of transportation and in the dividing up pie, the Department of Transportation was designated to receive additional funds.

I think at the State and local level, there is a recognition of the national commitment to investing in infrastructure to rebuild America. And therefore they will find themselves with more resources to make the hard choices, but also they will begin to see, because of the operational tests, the benefits that can come from the use of technology to enhance the system we have.

We are clearly moving from a period where we invested in the construction of our system to a period now where we are looking at how to enhance the efficiency of that system.

Technology holds great opportunity for us in that regard. I think also, because of the benefits that IVHS–ITS technology will bring to our communities, when it comes to dealing with environmental concerns, that that too will lead metropolitan planning organizations and local elected officials to looking to technology for some of those answers.

So I think because we are promoting the use of this technology more aggressively at the national level, because we are seeing positive examples of its utilization at the State and local level, that the word will start to get out that there is a benefit to be enjoyed here and now as relates to the use of technology.

And even though we have far-flung thoughts about how it might help us with the establishment, if you will, of an automated highway system, that is in the future. But there are benefits to be enjoyed today, now. And we think a lot of local governmental organizations, metropolitan planning organization and State officials will start to take advantage of that.

Mr. BORSKI. It seems to me it is going to take a lot of your energies to try to make this program work well. We don't have a system where the haves have the most updated, advanced system, and the areas that are most pressed for dollars wind up with much less. Good luck with it.

The Oak Ridge National Laboratory has estimated that between 1993 and 1997 it will cost the public sector between $8.5 and $26 billion to install advanced traffic management systems in the Nation's 75 largest metropolitan areas. DOT estimated that it will cost between $640 million and $1.8 billion annually to operate advanced traffic management systems.

Where specifically will the funds come from for deployment, operations and maintenance of advanced traffic management systems?

Mr. SLATER. Well, we have made available Federal aid funds for that purpose. States have at their disposal, MPOs have at their disposal, the use of National Highway System funds, the use of STP funds or CMAQ funds. But as I noted earlier, those funds are limited, and many States and local governmental organizations have sought first to focus more on those damages that exist that relate to our system as is; pot holes, bridges that are falling apart, transit systems, transit lines that need repair.

We think that we are going to have to really turn to the private sector, make the case with the private sector that there is a benefit to be enjoyed, thus there is an obligation to participate. That is why we think that the approach we have taken where we really work to build that sense of cooperation, coordination, partnership, consensus, is the kind of groundwork that has been laid here in the United States, that will help us to compete with the Europeans, with the Japanese, when it comes to a more comprehensive deployment of IVHS–ITS technologies. But clearly the private sector will have a role to play.

We also think that as we demonstrate, as is evidenced with the 1995 proposed budget, and as was the case with the 1994 budget, that this government at the Federal level is willing to invest more in the use and development of the technologies, and that the State and local governments will respond. And we have seen evidence of that as well.

Mr. BORSKI. Let me yield at this point to the distinguished gentlewoman from New York, Ms. Molinari.

Ms. MOLINARI. Thank you very much.

Mr. Administrator, every time you talked about areas where there are pot holes and bridges and unfriendly transportation systems, you appeared to be looking at me. I must admit when Mr. Linton was talking about having pagers on in Seattle or whatever, I just said, I can't really imagine this ever getting to this point in New York City where this would work. But I am certainly grateful that there are areas in the country where it does.

Mr. Administrator, let me welcome you. My staff asked me to thank you; they attended the seminar you all put on yesterday and they found it very informative and appreciated it.

Just a few brief questions. I am going first to Mr. Linton. When you talk about intermodalism and the abilities to engage private sector initiatives to minimize—and I am coming at this, admittedly, from a very parochial standpoint—can we involve, can there be benefits derived for private operators relative to boat service, for example, in Staten Island and New York where we rely on ferries? And we are trying to become more and more active in waterborne transportation between New Jersey and Staten Island. We are starting to look at that in order to relieve the congestion.

Mr. LINTON. Absolutely. As you probably know, we fund ferry operations around the country. And we are moving very fast in this Department towards intermodalism. We recognize how ferries and their interrelationship with the other modes can lead to the efficient movement of people.

We think the ITS–IVHS technology provides real opportunity to connect the ferries to transit, highways, airports and other modes. So we think there are real opportunities there.

I also know that fishermen are using GPS technology now to even locate schools of fish as they are moving around, looking for fish to catch. So it is obvious that the technology has broad applications for boats and other vehicles that are moving across waters.

Ms. MOLINARI. That probably wouldn't pertain to Newark Bay.

Mr. LINTON. We don't think so, either.

Ms. MOLINARI. I hope not, anyway.

Following up on that, how can we use, say, the IVHS or the ITS to help urban areas, the few that are still at nonattainment? Are they given special priority in your programs and your evaluations?

Mr. SLATER. We do have an effort where we are focusing on the 75 largest metropolitan areas. And that would take into account many, if not most, of the really strapped metropolitan areas when it comes to dealing with the Clean Air Act and some of the other environmental concerns.

And definitely we see IVHS–ITS technology as being of benefit to them. There is, though, this question that the use of IVHS technology might in fact relieve congestion on the roadways to the extent that others who are currently not using the roadways because of the congestion might then do so. And clearly that is an argument that we need to address.

But I think because of the benefits to the environment that IVHS–ITS technologies naturally bring to focus, bring to implementation, that that is a far more important focus on which we should direct our energies and efforts in justifying the investment than the possible downside to it.

And let me just give you a couple of examples of how this IVHS-ITS technology could be helpful. First of all, we believe that the traveler information systems and service also enable people to make better choices about whether to use their automobile or not, or whether to use a public transit system or not.

We also in the United States especially are devoting a lot of our attention to enhancing the transit system and program. And we think that advanced public transportation services will be a byproduct of the use of this technology. It can lead to more car pools and more efficient use of transit systems.

Also, management activities will help to deal with congestion caused by accident and nonrecurring events. IVHS technologies I believe will supplement the conventional emission control programs. So we believe that there is a positive benefit that will result and that will have really significant and profound impacts on our environment in a positive way.

Two States in particular have recently demonstrated beyond question that the use of electronic toll collection systems helped the environment: Massachusetts and New Jersey. And we just think that clearly larger cities will benefit from this technology.

And in the long run, with the use of the technology, relieving congestion, enhancing the environment, we may be able to turn the tide on so many businesses moving from the central cities and larger metropolitan areas because congestion adds to their bottom line, because they have to use detours to get goods from one location to another, or they have to use different times of the day to enhance their delivery efforts.

We are hoping that the use of this technology can give central cities and metropolitan areas a better chance at reserving, retaining, holding on to those businesses they now have as well as attracting new businesses and economic activity as well.

Ms. MOLINARI. Let me just ask one more overall question, if I may, Mr. Chairman. I think what you are doing is very exciting, and I suppose I share some of the frustration I heard in the Chairman's questions relative to a State or municipality's ability to take advantage of this, or frankly to see it as having a political advantage, to make that one decision for investment as opposed to all others. And really that is what we have to get down to. And I guess somewhere it is our job to get the message out that this kind of imaginative experience is occurring, and that people should be putting pressure on their elected officials to opt for this over other funding needs.

When you talk about—and particularly you, Administrator—in such tremendously ambitious terms, and I mean that positively, about moving goods and being competitive in the global market, yet I see certainly in the Northeast corridor, using the same roads and transportation system networks that we used 50 years ago, while it appears to me the rest of the world is in maglev and high-speed trains, how do we catch up? Is there any reason to expect we will be competitive when so many—it seems there are so many other nations that are making such tremendous progress and we are just light-years behind, particularly in terms of moving goods?

Mr. SLATER. First of all, I think that is really the crux of the matter, the real question, and a discussion of transportation as relates to the economy. For a long time we just haven't made that connection. We have thought more about transportation as a quality-of-life concern, and it is a major concern in that regard. It allows us to move from one place to another, a job to the market, a child to school. But also it serves as the very foundation for our economy.

Let me say first of all, I don't think that our position is as bad as we might expect. We are the most mobile society in the world. And while other countries are dealing with high-speed trains, maglev, improvements to their transit system and the like, they also are making significant investments when it comes to producing what one would call a system that is similar to our interstate system.

We have already put that in place. It is now in a state of disrepair in some areas because after we made the commitment and after we put forth so much effort to make it a reality, we got to a point where we started to disinvest in our infrastructure.

But I think that is because we were at a point where we could wake up and pretty easily move from one point to another without much difficulty. But when you have instances like the flooding of

the Midwest, the earthquake in California, now the flooding in the Northeast, which demonstrate clearly how natural disasters can frustrate the movement of goods and people, and how that necessarily impacts in a very negative way our economy, then I think we start to realize how important that system is, and we start to focus on the kinds of improvements that are necessary to address that system, that we might be able to continue to enjoy the things that we have become accustomed to enjoying.

I think the effort by this body in 1991 in passing ISTEA, which reshuffled the cards, we focused the effort of this country as relates to transportation, is that was good. Making an additional effort to resources, that was good. I think the effort by this administration to follow through on that commitment to resources, to up the ante, to give more money to transportation, I think that is good.

I think the fact that we have moved forth expeditiously to put forth a national highway system that is as limited possible, that only represents 4 percent of the 4 billion miles of roadway out there, but that focuses strategically on those roadways that are of the most importance, I think that is good. The fact that that 4 percent carries 40 percent of our Nation's highway traffic, 70 percent of the truck traffic, 80 percent of the tourist traffic, that is good.

And the fact that we have said, even that is not enough, this body, when it passed that system, 412 to 12, sending it to the Senate, said, We also embrace and welcome the Secretary's and the department's commitment to establish an even more comprehensive system of transportation that helps us to focus strategically on the important linkages and legs of the other modes of transportation in the form of a national transportation system, then I think that too is good.

I think our hearing today as we talk about the use of IVHS technology, ITS technology, and how we will use that to enhance the benefits of concrete, asphalt, rail, steel, port, et cetera, that make up this national transportation system, I think all of that is good.

So I think we are moving forth in a very aggressive, visionary fashion. I think our best days are yet before us. And I think that we will also take advantage of experiences like the celebration of the landing of a man on the moon, and I will note that when that commitment was made we didn't have all the resources then that we knew we would need to make it happen. And even though we couldn't envision all that would occur between 1963 and 1969, we still made the commitment. And even though during that period we went to war, we still held on to that commitment, and we then in 1969 enjoyed the benefit of that effort.

I think that was there then in the spirit of this Nation. I think it is here now in the spirit of this Nation. And I think we will respond to the challenge at hand. And we will win.

Ms. MOLINARI. After that speech I have to say, Administrator, I will vote for you. That was tremendous. I mean that very sincerely. That was a very positive and I think a very optimistic projection of the future, and that is what we want to hear from our administrators.

Thank you very much.

Mr. BORSKI. The Chair thanks the gentlewoman and concurs completely.

The gentlewoman from Michigan.

Ms. COLLINS. Thank you very much.

I have several questions for Administrator Slater. Will an ITS involve grids or any physical change to the highways, to the pavement?

Mr. SLATER. Yes, it will. And it is something that we should take into account every time we do a reconstruction, rehabilitation job. In Japan that is exactly what they are doing; they are making those kinds of investments now as they seek to improve, rehabilitate, reconstruct their system. We must do the same.

Ms. COLLINS. Is it very costly? Do they put microchips every couple of feet or miles? Will it really increase the cost of road building?

Mr. SLATER. It will increase the cost.

Ms. COLLINS. Tremendously?

Mr. SLATER. Well, I think we are still making a judgment about that. But the costs that will be incurred have to be balanced to the cost of not having it and not taking every opportunity to give ourselves the benefit that that kind of investment brings.

So while it will cost more, it is the belief of the department that to not come to grips with the need to make these kinds of investments now will cost us even more in the future when it comes to our competitive advantage on the international stage.

I might also add in that regard that your State of Michigan as well as a number—as well as all of the border States around the country will play a very important role in that regard. You have a number of crossings there in your State, and we must use technology so as to enhance the flow of goods and people between the United States and our number-one trading partner, Canada. And that, one of those major connections, is right there in Michigan, right there in the heart of the City of Detroit, as well as many others throughout the State and along other border States at both the northern and southern end of the country.

Ms. COLLINS. As your colleague, Christine Johnson said, it is almost at a standstill in Detroit-Windsor casino, gambling, which is our border city. So it takes sometimes several hours for traffic to come through both the bridge and the tunnel. And we are very concerned, Detroit locally is very concerned that the traffic will be diverted to Sarnia, Ontario, on Newport, Huron.

So you are aware of the corridor leading to Toronto. Do you agree that has taken a lead in providing work on IVHS, that corridor?

Mr. SLATER. I–75 is one of the workhorse links of our interstate system. And clearly in the area of Detroit, and I know Mr. Kelly is here from Kentucky, and I was recently in Georgia and other States to the Southeast where this particular workhorse leg of our interstate system, it traverses through all of these States as well.

I think that it serves as a model much like the I–95 corridor as far as the use of IVHS technologies. And because it is a route that is used by so much truck traffic, which works in a very important way to keep America moving, I think clearly it is a stretch of roadway that deserves our attention and more investment, and I do think it serves as a model for us as relates to the use of IVHS–ITS technology, and commercial vehicles.

Ms. COLLINS. Does that mean you are going to make it a priority then and integrate it into the ISTEA, ITS corridors?

Mr. SLATER. Definitely it is a priority.

Ms. COLLINS. It wasn't in your statement.

Mr. SLATER. Let me mention this. Did I mention having stopped at your IVHS center in Michigan which runs along I–75, and also when I was on my road tour I traveled much of I–75. So while specific reference was not made to that, clearly as you recognize the importance of this particular stretch of roadway, and it will definitely be one of our priorities.

Let me also mention in that regard that we have recently followed a study that is under way dealing with the I–75 corridor and have made a commitment to invest some resources to bringing about improvements that it is recommending. And those resources I believe will be made available in 1995. So clearly we are focusing on that particular stretch of roadway.

Ms. COLLINS. I am glad to hear that.

Mr. Linton, where are the Los Angeles kiosks located, the kiosks where they can touch the map and it will tell them the best way to travel?

Mr. LINTON. I believe they are at major loading points, Union Station, other locations. We think that application of those kiosks will be used throughout the country in various locations as well.

We think it bodes well for customer service by providing the kind of information that customers often have been complaining about: not knowing what time a train is going to arrive, having to stand there not having that information. By providing both the time of arrival of various vehicles as well as the location where those vehicles will be, we think it will greatly assest customers throughout the country.

Ms. COLLINS. Are they in the neighborhoods as well as, say, Union Station? Are they on both ends?

Mr. LINTON. At this point they are not, but the ITS–IVHS technology, including the kiosks, has broad application potential to go into neighborhoods. We are developing and looking at some things that will be in neighborhoods that will use that technology so the travelers in neighborhoods will have access to that information.

We also hope some of this technology, through the information highway will be provided in individual homes so that access will be provided through cable television networks. Some people will be able to have portable computers that will give them hand-held information that they can have as they walk around as well. We think there are various opportunities available for the use of that technology.

Ms. COLLINS. It is a brave new world.

Mr. LINTON. Absolutely.

Ms. COLLINS. I was wondering during your testimony about the smart card that is also—it is used for parking as well as transit. Perhaps it will be used for ATM machines and so forth.

How would people pay? Would the individual have to have a checking account or savings account that this card would be keyed into? Because most of our ATM cards are through the banks.

Mr. LINTON. That is correct. If we utilize the broad application that will allow use of the smart card for both commercial application, as well as for access to transportation, including parking as well as light rail vehicles as well as buses, we will probably be able

to use our banking system. The smart card technology application that is going to be used here in the Washington metropolitan area, however, will use devices that will enable you to begin with a card at a specific amount. As the card is used each amount will be deducted from the card.

It is interesting to note that when this application will be used, if the card is lost, the computer chips in there will tell WMATA exactly how much money remains on the card, so when it is replaced they will know exactly how much money is expended and what remains to be used as you use it throughout the system. So we think this is a great opportunity to make our systems much more customer friendly and convenient.

Ms. COLLINS. I do too. I have used one of those cards in Africa and in England for telephones. I guess you—it was very difficult for me, but you went to the embassy or someplace and you paid so much money and they gave you a card and you can use it in the telephone system up to the limit of the money that you have paid.

And I had money left over. But the embassy or wherever I got it from was closed.

Mr. LINTON. Maybe you should give me your card.

Ms. COLLINS. But it was like money in the bank. I thought it was really wonderful technology, and I am glad we are going to use that.

I just have two more things, Mr. Chairman. I am putting in legislation for the MPOs composition. Currently we do not mandate that MPO's representation reflects the population that it serves. So you have many urban centers that are under represented on the MPOs, and therefore it would be very difficult to get a consensus to invest in ITS or in urban areas.

And you have that same problem between the urban areas and the rural areas. We tried to pass a nickel tax for ISTEA, when Chairman Mineta had the ISTEA project going through. And we couldn't get a nickel passed through the Congress to pay for it because the rural areas said that would impinge on their people much harder than on urban people because they drive long distances.

So I just—it seems to me, as Mrs. Molinari said, some areas will not have the money, and they are the areas you need to target first, and those are your major metropolitan centers. They don't have the money to tax themselves directly. They need the system so they can get out to the jobs, to where the money is.

And if you count on the State legislature voting the money to invest in this, with most of the representation coming from rural areas, they won't do it. So I have an idea. And my idea is that first of all, it should be mandated by Executive Order that the ITS is going to be a priority in all States. And I think that the Federal Government should devise some kind of a tax to fund it so that the infrastructure can be laid down for the cities and the cities would have the obligation to maintain the systems.

I cannot see Detroit putting computers on every bus. Detroit can't afford to buy buses. President Clinton did allow us to have some buses in the last budget, but no money for operators. That is all right with me.

But if we can say that the maintenance of the highways and the vehicles could be a Federal responsibility—not the maintenance, I am sorry. The hard capital outlay would be a Federal responsibility, and the local responsibility would be to maintain it, and also to somehow or other tie it in with the rural areas.

Mr. Slater, I don't agree with but our transportation system. I have seen much better overseas. In England you can go all over the country via rail from London. You can go all over.

In America, through our deregulation of the bus, the transit bus, the airplanes, the only access that rural people have to the highway system now are the trains, and the trains are mostly only freight.

And I think we are going to have to include small-town America in with metropolitan America just to finance these systems, you know, and not leave people out.

That is a statement. Finally, do you, Mr. Linton, favor in mass transit light rail over buses or buses over light rail?

Mr. LINTON. Let me just say that I am mode neutral. When you pick a transit mode, it is important to note that the local conditions are what makes one mode more appropriate than the other.

I think in some communities light rail is very efficient because you have the opportunity to take advantage of the amenities that would be built around the light rail system so you can utilize that population density to support the ridership.

In other communities, the bus is a much more effective tool. It gives you both flexibility and opportunities to go and disperse in areas of the community where there is density and provide service in that way.

So I think it depends on the location and the community and not just planning by transit, because, unfortunately, in this country we have not always looked at transit—transportation in a holistic planning mechanism. We have seen transit in isolation.

You also have to look at where your industrial parks are being built, where retail establishments are being built, baseball stadiums, medical centers. You have to look at it holistically in deciding which mode is best and which mode provides the best access for people in that community.

Ms. COLLINS. I agree with you. Our Chairman of Appropriations Transportation Subcommittee is very much opposed to a rail or mass transit, isn't that right, Mr. Chairman?

The CHAIR. Your colleague from Michigan has a different view of the world, unless it is made by General Motors or Chrysler or Ford.

Ms. COLLINS. We are going to rectify that. I am going to take his place on appropriations. But when you talk about—you had your five points, one of them was the environment. And it seems to me that fossil fuel is a finite fuel. Not only does it contaminate or pollute the air, but it is also—we are at the mercy of foreign countries to, you know, bolster our own oil production, and it just seems to me that the best and cleaner way to go would be rail, would be transit.

So I hope that you will look at the things that I have told you, and I am very glad that both of you are so futuristic in your thinking, because the planning is the most important part of it.

And after that, I think to execute this, though, it is going to take Executive Orders from the White House, because there is going to be so many parts of America that will not opt in, and if they don't opt in, then you will have ITS going say from Detroit to Cleveland and stopping and then, do you see what I mean?

Mr. LINTON. Sure.

Ms. COLLINS. So it has to be a nationwide plan.

Thank you very much, Mr. Chairman.

Thank you.

Mr. BORSKI. Thank you.

The gentleman from California, Mr. Baker.

Mr. BAKER. A brief question I had in the colloquy there, I looked through my clippings for today and I see the Federal officials are challenging a plan for funding the Disney garage, pitting the new rail service between Costa Mesa and Orange County in San Diego versus a parking garage.

The question to you is, since the Orange County Transportation Authority, who has to weigh all the modes of transportation in their choked-up area, approved this, why is the Federal Government saying you shouldn't be able to have parking lots forever but build a multistory parking garage, figuring it would conflict with a rail service from San Diego to Costa Mesa which is used for business and industry and really isn't directly related to Disneyland?

Mr. LINTON. Congressman Baker, let me respond to that. We are not opposed to a parking garage. Let me say that the application for that project was a transit application. The project that was originally submitted to us had transit implications. In fact, it was a parking garage facility at one point in the early discussions.

What we have said is that those provisions of the project that are transit related, we are willing and happy to support. Those provisions of the project that are not transit related, we think it inappropriate for FTA to fund.

Mr. BAKER. Excuse me. I think I am getting the drift, but it says here that the administration expressed concern that building the garage has caused local transit officials to scale back plans to expand bus and other services.

What you are saying is they are misappropriating transit funds to use for a parking garage rather than the fact that it is a war between the various modes?

Mr. LINTON. That is right. I am saying that if in fact—if the entire parking facility or segment thereof provides parking for riders who are going to be using transit facilities, we fund those all the time and we have no problem in funding a facility that is going to provide access for cars for users of transit.

We have also said in that particular instance that when in fact portions of that parking garage will be used for transit users, we are willing to pay for that as well, but if in fact 80% of the parking garage will be used for those who will be using automobiles to go to Disneyland and not use transit, we think it inappropriate to use transit funds to pay for that element of the parking garage.

Mr. BAKER. I understand better. I want to thank both of you for being constantly accessible to this committee, and I am amazed our committee Chairman is here for all of our subcommittee meetings, and the highest level of officials from the administration are here.

Thank you very much. We appreciate the access we have to both of you.

Mr. BORSKI. The gentleman from Wisconsin, Mr. Barca.

Thank you very much, Mr. Chairman.

I would like to also concur with the comments just expressed by the gentleman from California. I would certainly concur with those, as well as some of the other remarks that were made. We do appreciate your leadership. I am very enthusiastic about this effort that you are putting forward and about the initiative that is taking place. I think it holds great promise for the future of our transportation efficiency in this country.

In particular, of interest to me and my State of Wisconsin and the district I represent is the corridors that are under way. We are in a nonattainment zone really pretty much throughout that Chicago-Milwaukee area and are coming under the constraints of the Clean Air Act, and we are hoping this will help us enormously in terms of helping us meet the goals that had been set forward.

So that is an initiative in particular that I am very enthusiastic about. I know it is moving along and I hope we can make sure we have that strong partnership between our States within that Indiana-to-Chicago-to-Milwaukee corridor, and can work cooperatively to make sure that works.

The second point I wanted to make, though, deals with the fact that I had chaired a hearing back about a month or so ago on this partnership for a new generation of vehicles, which I am also very excited about, the promise that holds in terms of helping to reduce our expenditures as well as trying to get at fuel efficiency. Along the lines of what Mrs. Collins was talking about earlier, the whole issue of fuel efficiency, and to what degree I guess that is a priority within this initiative that we are talking about today.

One of the things that startled me during the course of that hearing, and I guess I had heard the statistic before but it just seemed so graphic when they brought it up, is that in 1973, during the height of the Arab oil embargo, we were importing 24 percent of our oil from overseas. Now it has risen, you know. It has doubled in 20 years. In fact, we made somewhere near the 40 percent to 50 percent range. And I think that is particularly troublesome. And I think that we have to make sure that remains one of our top priorities.

I was looking over the goals that were established for this program. There were five goals that were listed. And it seemed to me that underlying the goals was this issue of fuel efficiency, but it was not explicitly mentioned in any of the five goals, which I think is perhaps a mistake.

My question here today is, to what degree is your looking at different initiatives throughout the context of the intelligent vehicle highway system program is this a major goal within the administration and how are you attempting to make sure that that remains at the forefront of our efforts along with the goal of also reducing air contaminants, which is of particular interest to my district?

Mr. SLATER. First of all, Congressman, it is an issue that is high on the administration's agenda. The department very much supports the administration initiative for the development of the clean

car, and clearly when you look specifically at IVHS–ITS technology, it is our hope that especially with an emphasis on how this technology can be used to enhance the efficiency of not only the highway system, but more importantly in this regard, I think, the other modes of transportation, especially transit, we believe that that kind of emphasis will necessarily start to deal with our dependence on fuels that cause damage to our environment.

We also think it is probably important to talk about this issue at some point as a national security issue. And I think your comments were really alluding to that fact. Transportation has always been an issue that has been closely connected to national security.

I am reminded that about some 75 years ago this month, then-Officer Eisenhower started out on a transcontinental trip across the country just to determine what the deployment limitations would be for our Armed Services based on our transportation system at the time.

He then, coming back some years later as President, saw this concept of an interstate system on the table tied to it a focus on our national security and military deployment, and was thus able to make a case that was much stronger, because that was something that the American people could identify with.

As we have submitted the national highway system, we have done the same thing, focusing on those STRAHNET connectors that connect to our various military installations. So clearly I think possibly structuring this issue in a way that would help us to connect it with national security might be a way of helping us to speak of it in such a way as to resonate and connect with the American people, and thus build a kind of public support that would be needed to deal with this in an effective and aggressive manner.

But in the short term, I think it is our joint agreement that IVHS technology, ITS technology will provide us a first step in dealing with this most important issue.

Mr. BARCA. Well, certainly I think that is true, and I agree fully with everything you have indicated. Let me just ask more specifically, obviously as part of the IVHS technology you have to make decisions within your department of what specific kinds of research grants to fund, what your priorities will be in terms of helping to achieve the overall efficient movement of traffic, which as you indicated is where you get the direct correlation between fuel efficiency. What I am wondering is, when you are scoring those applications when you are trying to decide whether to approve one research grant approach versus another one, where does this issue rank in the decision making, the overall goal of trying to get at fuel efficiency and looking at our dependence on foreign oil versus the myriad of other goals which obviously you have to balance, such as safety and other issues which are certainly important?

Mr. SLATER. I would have to say that with the commitment of the administration to the clean car initiative having been made, that this will become much more of a matter of concern as we make decisions about operational tests and the like. And I would also commit to you, Congressman, to carry this very important point that you have driven home today back to the Secretary, and we will have some discussions among the players within the department

and come back with some clear evidence of our sensitivity to the point you raise.

Mr. BARCA. I appreciate that very much and thank you very much for being here today. Your testimony is extremely helpful to us.

Mr. BORSKI. The Chair thanks the gentleman.

The gentleman from Michigan, Mr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman.

I have no questions. I just want to thank the gentlemen for being here as the representative from the automobile State. I am not sure which of us will get to the Appropriations Committee first, but we will see that next year.

I do want to thank the gentlemen for being here and appreciate the information they provided. Thank you.

Mr. BORSKI. The distinguished gentleman from California, Mr. Mineta, the Chair of the Public Works and Transportation Committee.

The CHAIR. Thank you very much. Let me thank you and Mrs. Molinari for the leadership you are showing by having these hearings. I apologize for not having been here for your testimony but let me quickly run down some questions here.

First of all, does Dr. Johnson require Senate confirmation?

Mr. SLATER. No.

The CHAIR. I notice in your statement you referred to her as Director-designee. I was just wondering——

Mr. SLATER. We just used that because she will not become an official member of the staff until Monday, but she does not require Senate confirmation.

The CHAIR. Let me give you a preliminary—I guess congratulations are in order—one of the things that has troubled me about the program. We instituted this in 1991, and I can just very briefly try to give a little history about where we were prior to ISTEA.

In the six-year period before the adoption of ISTEA, I believe we did about $100 million of R&D, and then from ISTEA on we put in—originally I put in $180 million before IVHS. We finally ended up at $159 million as a result of the conference. On top of that we put in $100 million a year for R&D. So we had over a six-year period some $759 million either in IVHS or R&D.

I am pleased to see the public-private sector kind of cooperation as well as competition that is going on. But I guess the thing that bothers me is that we are doing a lot of research and development. We are not getting to implementation. We are not getting this stuff to where it really ought to be working. I don't know why that is. I don't know whether that is—is that standard setting and we are waiting for someone to say we have got to do standard setting? On the other hand, standard setting could be a long way. Or are we letting the marketplace sort of determine this?

If you look at Beta versus VHS, you know, is that what we are waiting on? But one of the things that does bother me is—is this going from research and development to implementation?

Now, is part of this the fact that we are so good at inventing, and I think we have proven that in other fields, we invent stuff here, but we never end up—I shouldn't say never, but in many instances we don't end—up manufacturing it here because someone

else takes it, starts manufacturing it, even though we invented it here, we are sort of slow to make it come to fruition in reality.

So let me ask you first, where are we in terms of going from this transition of research and development to the real world of having it in place? Who would like to start?

Mr. LINTON. Let me start, Mr. Chairman. Thank you. I think that you made an interesting point.

First of all, I was going to say when Ms. Molinari asked a question earlier and she was talking about the technology that we have in this country, that the maglev technology, for one, was one that was developed here and ended up being deployed elsewhere and now we are trying to import it and use it in our own country.

I think we are trying to make a major effort through our operational tests, to make sure that the technology we want to use meets all of the concerns of the users, but we also are making a major effort to deploy the technology. At least with the transit aspect of IVHS, we are using a number of demonstration projects as well as deployment around the country.

I, too, would like to see our technology research put to use and not be just a study lying on the table.

The CHAIR. And also made here. I think making it here is very important as well.

Mr. LINTON. That is right. But we are making a concerted effort to take the research, the testing that has been done, and try to deploy it in actual operation throughout the country. So we are trying to do that.

The CHAIR. The thing is that with this large amount of money that is out there, whether it is R&D or IVHS, we have a lot of people who are gravitating to that pot of money. And sometimes I wonder what are we doing to protect ourselves from the—what do they call it—the salesperson who comes along wanting to sell you something—maybe it comes from defense technology, which is fine, maybe there is a lot of stuff that is part of defense technology that is dual use and we can buy it. But I don't want to see ourselves dissipating this money just because some sharp-looking salesperson with a catalog comes along and says, tell you what I am going to do for you.

I don't know if it is an unfair characterization, but let's say people who have developed the smart bomb, and that was to take the bomb and lay it on the front-door steps or the front door of the bunker where Saddam is—can we use that technology to move transit and vehicles around?

I don't know, but we seem to have a lot of people rapping on the door because of that—as the defense and aerospace contracts go down, we see everybody gravitating to IVHS. Five years ago some of these people didn't know how to spell transit. Today they are transit experts and want to come before you and me and say, hey, we have got the technology to do something.

I just wanted to make sure we are not going to be subjecting ourselves to the salesperson who wants to sell his or her latest wares.

Mr. LINTON. Congressman, we are trying to be strategic with our investments. There is no question we are being inundated with a number of individuals who have a new technology advancement that they want to have the Federal Government finance, and de-

ploy. We are being both cautious and strategic in terms of identifying those we think have broad application across the country, and those that we think we can employ with a good return on the investment to the American public.

So we are very, very careful in both examining with our staff and also using the Volpe centers and others to make sure that we are making strategic investments in the choices that we make.

The CHAIR. The Volpe Transportation Center is not a dedicated modal transportation center?

Mr. LINTON. That is right.

The CHAIR. The reason I guess I get sensitive about this is because I chaired the Aviation Subcommittee when we went through the August 3, 1981 PATCO strike, and we essentially fired, I don't know, maybe 11,000 air traffic controllers. Lynne Helms, then FAA Administrator, said we have to come up with a different system, maybe more automated, et cetera, and out of that came the automated—advanced automation system at FAA.

I think a lot of us know what the status of that contract is right now. I don't want that happening to IVHS. I was there at the time we put together AAS. I was there with the help of this committee, all of us working to put IVHS together. Five years from now I don't want to look back and say, oh, my gosh, look at this, we are in the same place with IVHS that we are now with AAS.

So I just want to make sure that whatever you are doing out there, you are not being blind-sided by some technocrat, technologist, because, wow, whiz, bang, another whistle, another bell.

Mr. BAKER. Will the gentleman yield?

The CHAIR. I want to make sure we get it out there to be able to improve the flow of traffic, efficiency of automobiles, whatever it might be.

I will always be glad to yield to a graduate of Santa Fe State University.

Mr. BAKER. It was Santa Fe Normal when I went there.

To answer your opening question about the technology from the war and defense strategies, on panel number four today, we have Tony Chargin, Associate Director of Energy. He is going to be bringing to us——

The CHAIR. I have been there to Livermore and seen what——

Mr. BAKER. They are not going to be selling anything but they have been meeting the transportation agencies and telling them about their technology and what is available in smart transportation.

The CHAIR. Tony has heard that same line about smart bombs.

Mr. BAKER. He is trying to bring that technology to us, not selling any, but letting us know what is available. We appreciate again the cooperation of the agency in meeting with them.

Mr. SLATER. Mr. Linton I think responded well to the series of questions that came forth, but I just want to add a bit more to the comments he made.

Your point is well taken about the amount of money that is being spent helping to develop our initiative, a broad-based, comprehensive initiative to really deploy this technology in a comprehensive and profitable way. There are certain steps that we have outlined to be taken to ensure that we don't get into the program, where

we have invested a lot of seed money, but we have come to the point where we are within not talking not about millions but billions when it comes to deployment. And we have no sense of our direction from the movement from operational tests to full deployment.

We believe that through the IVHS strategic plan that was presented some years ago, laying out some general guidelines for our efforts, that we were beginning to chart that course. We are now in the second draft of our IVHS program plan and we think that gives us additional information which will allow us to move with some sense of security on this very slippery slope.

Because clearly it is a slope where if we institute standards too early, we could in effect choke off innovation and creativity which has served as the engine for activity in this country for well over 200 years. If we fail and don't act quickly enough with the standards to clearly direct us on our way, then we might have exactly what you talked about as relates to Beta and VHS, a proliferation of approaches with none actually able to connect one to the other.

We think that our system architecture effort that is under way now, where we have four teams leading us in the effort competitively to devise what will be an open, comprehensive system architecture that will allow all of these systems to compete or to communicate one to the other, we think we are moving forth carefully, reasonably, along that track.

We hope to have the results of those efforts soon. At that point, then, we will be able to focus once again on the architecture that we will move forth with then as the model.

While we are not enjoying the kind of deployment efforts, say, that are being enjoyed now in Japan, we do think that with our more methodical and comprehensive approach, we will be able to, once we start deploying this technology, move forth without the start-stop approach that is somewhat evident in Japan now, and we also believe that our effort will be more comprehensive.

We think that it will focus, as it should, on commercial vehicles in a way that nothing else on the market now addresses as we would like for it to address. Electronic toll collection. Public transportation applications. The automated highway system.

We are taking a lot more time. But we believe that once we get back the return on some of the dollars we have invested, we will know better where to go, how to get there and what the result will be.

We share your concern, Mr. Chairman, that we have a day of accounting to the American people that is coming soon. And we don't want to be in the position of saying we have invested a lot of money, seed money. Now we have come to the time when we have to invest billions for deployment.

And we have no idea where we are going in this process. So I have just said that to underscore our sensitivity to the point that you raised.

The CHAIR. Dr. Johnson will be heading up this joint IVHS program office.

Mr. SLATER. Yes.

The CHAIR. I notice that program office is within Federal Highway Administration. How does this relate, then, to the Office of

Intermodalism, or how do we make sure that we do get modal input, the Joint Intelligence Vehicle Highway Systems Program Office reports to you and the Deputy Administrator. And I am not sure——

Mr. SLATER. Also a committee that includes all of the modal administrations and administrators, and that would include the Office of Intermodalism. This is the first joint program office we have set up in the Department of Transportation.

The subject matter I think warrants this kind of initiative. And it is done with the recognition and a commitment on our part that the office would deal cross-modally in addressing this very important issue of IVHS–ITS technology.

The CHAIR. The joint IVHS–ITS program office is connected to you.

Mr. SLATER. Yes.

The CHAIR. What is the Intelligent Vehicle Highway System Management Council?

Mr. SLATER. That is the organization that includes all of the modal administrations. So that would include all of the modal administrators.

The CHAIR. Mr. Linton, do you have an IVHS program office within your shop?

Mr. LINTON. We have the Office of Technical Assistance and Safety that works with the IVHS program office, but also, Mr. Chairman, let me note that we are deploying staff from FTA to be part of the interagency office. So are the other modes within the Department. We are going to have a full-time staff person that will be part of the management of that office as well.

Mr. SLATER. NHTSA as well.

The CHAIR. Are those people detailed from your agencies to the IVHS program office within FHWA?

Mr. LINTON. That is correct.

The CHAIR. And then the management council, I take it, is DOT rather than modal?

Mr. SLATER. Right. That is correct.

The CHAIR. There is a two-tier system here. Modal people are here working under the IVHS program office, then there is an IVHS management council out of the Secretary of Transportation's office, made up of people like the Deputy Secretary, the Assistant Secretary for Transportation Policy, the Assistant Secretary for Budget and Programs, et cetera, who are part of the management council?

Mr. SLATER. As well as the modal administrators. And that body acts much like a board of directors.

The CHAIR. To the IVHS program office?

Mr. SLATER. Yes.

The CHAIR. That gives me a better feel for what is going on. Well, let me again thank both of you for being here, for the work that both of you do.

You have brought new spirit, and invigorated the action of both the Federal Highway Administration and the Federal Transit Administration. I know those of us on this committee appreciate the time and effort, and the leadership that you have provided to all of us across the country.

Thank you very much.

Mr. BORSKI. I thank the distinguished Chairman.

If there are no further questions of this panel, we want to again thank you very much. I just want to add to what Chairman Mineta has suggested and once again compliment you on the way you work so well together. It is a perfect example for the rest of us in the transportation community. There should be no lines between transit and highways and all transportation.

Thank you very much.

For the second panel, we have Mr. Don C. Kelly, Secretary, Kentucky Transportation Cabinet; Mr. James van Loben Sels, Director, California Department of Transportation; Mr. Richard Stehr, Director of Planning, Development, and Traffic, Metropolitan Division, Minnesota Department of Transportation; and Mr. David J. Hensing, Deputy Executive Director, American Association of State Highway and Transportation Officials.

[Witnesses sworn.]

Mr. BORSKI. Let me say since we have a number of witnesses to hear from yet today, I would ask you limit your oral presentation to five minutes, and of course your entire written statement will be made a part of the record.

Mr. Kelly.

TESTIMONY OF DON C. KELLY, P.E., SECRETARY OF TRANSPORTATION, COMMONWEALTH OF KENTUCKY, CHAIRMAN, POLICY COMMITTEE, ADVANTAGE I–75, CHAIRMAN, ADVANCED TRANSPORTATION SYSTEMS OPERATIONS SUBCOMMITTEE, AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS [AASHTO], ACCOMPANIED BY DAVID J. HENSING, DEPUTY EXECUTIVE DIRECTOR, AASHTO; JAMES VAN LOBEN SELS, DIRECTOR, CALIFORNIA DEPARTMENT OF TRANSPORTATION; RICHARD STEHR, DIRECTOR OF PLANNING, DEVELOPMENT, AND TRAFFIC, METRO DIVISION, MINNESOTA DEPARTMENT OF TRANSPORTATION

Mr. KELLY. Thank you, Mr. Chairman, Members of the committee. I am Don Kelly. I currently serve as Secretary of the Kentucky Transportation Cabinet; Chairman of the Policy Committee for ADVANTAGE I–75; and Chairman of the Advanced Transportation Systems Subcommittee of AASHTO.

I really appreciated Chairman Mineta's questions relative to what is going on in the real world. I believe you will hear from this panel where the action meets the road.

While it is exciting to talk about the future roles of technology in helping to meet America's transportation needs, I sit in a unique position. I must answer daily to a Governor, the legislature, the media, and Kentuckians, most of whom do not have much patience with government. They all demand to know how I am spending the money today to make their jobs more secure, their travel safer and their transportation system more efficient. I simply cannot wait five or 10 years to provide answers.

The whole concept of ADVANTAGE I–75 was predicated on the goal of using existing and evolving technology in a program of projects which could be implemented quickly in the real world. I in-

tend to demonstrate for you today the reality of this concept and how we are working together in a partnership of public and private agencies in the Interstate 75 corridor to achieve a state-of-the-art commercial vehicle program.

This is being accomplished through government and private entities sharing in the implementation responsibilities, and each committed to making the project a success. The project is a partnership of the States of Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan, and the Federal Highway Administration, along with the Province of Ontario. We see this project as laying the groundwork for expansion of other portions of the interstate system.

What is ADVANTAGE I–75? I said earlier it is a partnership involving many States and many private entities. What I would like to talk about mainly today is what we call the Mainline Automated Clearance System. We sometimes abbreviate this as MACS.

The basic provision for MACS is to allow transponder-equipped and properly documented trucks to travel any segment along the entire length of I–75 and Highway 401 in Canada with no more than a single stop at an inspection station. This goal of reducing or eliminating weigh station stops has been the objective of MACS since its inception and it remains the objective today.

How do does it work? It is based on the use of automatic vehicle identification technology to electronically identify and process a truck while it is on the mainline, while it is actually moving. The AVI subsystem consists of truck-mounted transponders and roadside readers. The basic concept can be described as follows.

When a truck begins a trip on the I–75 corridor and is processed through a weigh station, specific information about the vehicle and the transaction, for example, the date, time, location, weight data, axle data, will be collected and stored electronically in the truck's transponder. As the truck continues its trip and approaches a subsequent weigh station, the information in the transponder can be read by the roadside reader in advance of the station. The reader's computer processes the information, makes a clearance decision, and communicates this decision to the transponder. The transponder has built-in driver communication functions, lights and audible tones, that signal the driver either to bypass or to pull in.

We currently are in the process of implementing what we call the demonstration project, a total of 30 weigh stations, 22 in the United States and eight in Canada will be involved, and involving basically or initially a total of 4,500 trucks equipped with transponders. We have stations which are being operated in what we call the alpha test, the first phase of this.

The purpose of the alpha test is to test the system and identify any problems before proceeding with the installation of the remaining 28 sites. Approximately 220 trucks have been equipped with transponders for this test period and are receiving bypass or pull-in indications, as appropriate, at the weigh stations.

Our current project schedule involves having equipment installed at all 30 weigh stations by March 1995, at which time the operational tests will begin in full and will last for two years, ending in March 1997.

How much does it cost? The total cumulative public sector cost of the ADVANTAGE I–75 operational test project will be approxi-

mately $12 million. The Federal Government is providing 80 percent of this funding, with the balance being provided by the ADVANTAGE I–75 States and the Province of Ontario.

What are the anticipated benefits? The primary benefit of MACS will be increased productivity for trucking. A reduction in the amount of time spent waiting for processing in weigh stations will directly translate into cost savings, increased productivity, and more reliable delivery, on-time delivery of goods. Increased trucking productivity will in turn result in lower transportation costs and lower costs of goods to the consumer.

In addition, reducing the number of times a truck must decelerate and accelerate as well as reducing idling time will result in improved fuel economy, reduced exhaust emissions and also safer automation.

We anticipate that during the two-year test this operation will save the trucking industry about $16 million, which is a good return considering this is a demonstration project. It shows a high return on the cost. Potential growth of the system involves expanding the number of trucks. Eventually the whole system will be eligible for expansion of trucks.

Also, we are looking at the potential which has come up several times in this standard question about geographic expansion to other sections of the interstate network. This is, as I said earlier, the first phase of it. We are also looking at many enhancements. These are contained in your handout. I hope you will have time to look at those.

Basically what we are saying is ADVANTAGE I–75 is geared toward rapid deployment and an early success. It is also directly in line with the priorities of the IVHS CVO task forces.

Those priorities are: commitment for the demonstration of a national information system that electronically clears trucks and buses by 1997; accelerate the automated roadside plan and meet Congress' requirements for automating 100 roadside carrier inspection sites by 1996; accelerate efforts that use IVHS technologies for hazardous material incident notification; four, expand the electronic clearance concept of Canadian and Mexican borders to support the implementation of the North American Free Trade Agreement; and finally, accelerate development of on-board monitoring systems.

The ADVANTAGE I–75 has from its beginnings been directed towards providing an early success story in Intelligent Vehicle-Highway Systems. The motor carrier project has been intentionally focused on a specific, achievable objective. ADVANTAGE I–75 is intended to provide an example of how IVHS technologies can be applied now, at moderate cost, to achieve tangible benefits, while also allowing for expansion and enhancements as new technologies and applications are developed.

Madam Chairwoman, I appreciate the opportunity to share this information with the committee.

Ms. COLLINS [presiding]. Thank you very much. Mr. van Loben Sels.

Mr. VAN LOBEN SELS. Thank you, Madam Chair. I am James van Loben Sels, Director of the California Department of Transportation. I appreciate this opportunity to go on record on behalf of all

of the partners in California, not just the Department of Transportation, to discuss and support the IVHS or ITS program.

We see this program to be an essential part of our mobility future for California, which we look not only at moving people, but goods and information as an integrated challenge and a great opportunity for us in California for the quality of life and our economic livelihood.

And IVHS can contribute to that program, that integrated transportation system across all the modes to ensure that system operates safely, because IVHS does and will contribute to safer operation of our system. We want a system that is equitable, that is, it reaches every Californian and every citizen of these United States regardless of where he or she may live or what their economic situation may be.

We want that system to be environmentally sound so that on balance the IVHS program enhances and improves our environment as well as contributes to mobility. We want it to be integrated and multi-modal. In other words, this is not for highways or trucks just alone, but it is for public transit, for rail, and connectivity to our ports and both seaports and airports for moving of goods.

And we want the system to be energy secure. We want that system to be efficient so that in fact it contributes to the energy conservation in our Nation.

This is going to be achieved in part through great cooperation, cooperation that I see from the Federal Government, from the IVHS Society of America, leadership across the country, and certainly within California, the Department of Transportation taking a lead in coordination, and of course as the owner/operator of the State highway system, applying these programs to our own system.

But also working with the MPOs, local cities and counties, transportation authorities, the industry in our State, we too see this as an opportunity for defense conversion, and for the economic recovery of California, which has been so challenged by our great transition to world peace, and to the national laboratories, and our great university research and development system.

All of this and all of these people are coming together in an alliance which I think can only bode good for the future. I am here to also applaud the standards and architecture-setting endeavors that are being led here in Washington. We believe that the evolution and the development of standards are essential so as you move from city to city and from State to State, the systems will work.

We believe that they ought to be open and flexible so that various competing technologies or the evolution of the system can in fact occur, and we don't unnecessarily constrain early development, but at the same time transition to standards for the future.

I would emphasize that it will be important to continue the stream of funding from the Federal level for investment in those demonstration projects that really demonstrate that this thing works, and for those operational tests. I would mention a couple.

Our priority corridor, we have one of them that has been designated for Southern California. There are 15 million people that live there. It includes an international border, great ports, and of course the cities and counties on the freeway system, and a re-

gional and local transit rail system, and we see great opportunities to demonstrate and continue the actual deployment of these technologies.

We have an exciting program in northern California, get information across all the modes to that great population and then connecting it to the Tahoe Basin, where we will have an opportunity to deal with movement on a corridor that is often interdicted by adverse weather, and better information, better warning, better response times for emergency medical services and other responders, know what is going on, where it is going on, and being able to respond whether you are driving in a car or traveling in a bus or an operator of a snow plow.

All of that is building on the programs, the building block approach. And I think Chairman Mineta's concerns about working and spending hundreds of millions of dollars over five years and then discovering it doesn't work, I don't think it is going to happen here, where you are using a building block approach, you are testing pieces of this thing, and as you find pieces, whether it be ramp meters or changeable message signs or kiosks, if they work, then local cities, States, and then where you need equipment in your car, the traveling public, the market will determine whether this thing is going to be deployed, and we spend big money.

And the marketplace, the marketplace both the public marketplace by public officials at the local level and individual consumers as we choose to move from air bags and anti-lock brakes to smart collision avoidance systems that have appeared on Greyhound buses and in the fairly near future will appear in our cars, we have to be willing to pay for them, and we will be willing to pay for them when it is demonstrated that it is cost effective and they are able to save lives and the insurance companies agree by their rate structure. And that is going to be the leveling and the test. It will be the mark plate, both by the taxpayers and by us as individual choices.

So I think there is a bright future for this. So I would encourage confidence in where we are going and sustain the funding, sustain the funding and move into the automated highway system with that same confidence and to that great demonstration that is on the drawing boards.

Thank you very much.

Ms. COLLINS. Thank you.

Now, Mr. Richard Stehr, Director of Planning, Development and Traffic, Metropolitan Division, Minnesota DOT.

Mr. STEHR. Madam Chair, my name is Richard Stehr, Director of Planning, Development and Traffic for the Metropolitan Division of the Minnesota Department of Transportation. One hundred sixty-seven miles of the freeway system in Minneapolis-St. Paul is currently under a system of sensors, cameras, and ramp meters that control traffic, all connected by a fiber-optic communication system that brings information to our control center and also connects us with enforcement dispatching centers, transit dispatching centers, and a couple of city and county traffic operation centers.

This system is expanding at the rate of about 25 or 30 miles per year. We will have 100 percent of our freeways covered by the year 1999. This program didn't happen overnight. It started with a Fed-

eral grant in 1972 that allowed to us build the world's first building devoted to the management of traffic on freeways. And from that modest 10-mile segment we were managing in 1972, it grew slowly to a 30-mile system in 1988.

In the last five years, though, it has expanded to five times that size, and it will double again in the next five years. I want to talk to the committee about three aspects of Minnesota's program. First, why we were successful in doing what we have done. Second, the benefits we are seeing from this program. And third, where we are going in the future.

First, the success factors. The primary success factor for us is the building of regional credibility, of public acceptance through a number of years of debate in newspapers and before committees and with city councils, we have built up credibility and educated the public on the benefits of the system. There is no shortcut to this. Hundreds of tours through our center and hundreds of letters written in response to people was the way we have built credibility.

Second, we have built up expertise in designing, implementing, and operating these systems. We are now capable of adding a 10 to 15 mile project every six months to our system. For many cities this is a two or three-year effort, if they are just getting started.

Third is top management support in the Department of Transportation in Minnesota that is committed to the building and ongoing operation of these systems. Fourth, a critical component since ISTEA, has been MPO support which has allowed us to use NHS, STP, and CMAQ funding to maximize our rate of deployment.

Now, the benefits. On a typical 15-mile segment where we are installing the system, we see a 27 percent reduction in peak period accidents. Traffic volumes actually go up, so this converts to a 41 percent reduction in the accident rate, the number of accidents per million vehicle miles.

We also see a 35 percent increase in average speeds, and we see a fuel consumption drop of over 1 million gallons per year in these corridors. Now, why does this happen? Metering does a number of things. It smooths out the merge. It breaks up platoons of vehicles entering the freeway and reduces shock waves that occur. It spreads out surges of traffic as they approach key bottlenecks in our system. We have seen instead of a maximum capacity of 1,800 vehicles per hour on an uncontrolled freeway, we can actually increase that to 2,200 or 2,300 vehicles per hour on a sustained basis.

Other benefits to these systems are to transit. We provide bypasses to many of our ramp meters which gives transit and car poolers a three to five-minute advantage in getting on the smooth-flowing freeway. So what is next? Where are we going in the future?

That answer for us came by establishing the Minnesota Guidestar program in 1990. That is an organizational framework for a broad ITS program of research development and operational tests. It has a Statewide, urban and rural, and multimodal focus.

Through this Guidestar program, we have launched nineteen research and development projects, twelve major operational tests, and four scoping studies that we expect to lead to operational tests. It has a broad approach, not a single corridor or a single technology or a single mode.

One example of this program I would like to share with you is the Trilogy project, a three phase project for testing wide area broadcasting of traffic data. It builds on our existing program of providing traveler information through a partnership with the Minneapolis Public School System. They have an FM radio station we have been using for broadcasting audio traffic information.

The Trilogy project uses the FM side band to broadcast digital traffic information. In the first stage of Trilogy, we tested three different kinds of smart vehicle receivers that decode this traffic information. Two of those types are being carried on to the stage two. One has a colored map display that presents the motorist or the driver with information on where incidents are occurring in the system and allows him to zoom in on specific incidents that might be in his travel path.

The second type is a synthesized voice that presents the driver with information in an audio form which he can verify by checking his text display. Stage two carries this pilot test to a broader operational test which has been selected by the Federal Highway Administration for funding. We will be looking at a number of different commercial applications. Transit buses, couriers, trucking, taxis, school buses, sheriffs' vehicles will all be participants in stage two as well as private individuals. There will be over 350 vehicles in this test.

Stage three, then, if stage two is successful, will be full-scale deployment where the public sector is committed to ongoing support of and broadcasting of the information and private commercialization of the vehicle devices will occur.

There are other operational tests at Guidestar, including a rural project called Artic, which are in my written testimony which give a broader and clearer picture of how Minnesota ITS is really a major part of our present and future transportation systems.

We are convinced of the tremendous benefits of ITS. We are committed to ITS' rapid deployment. We are poised to help the Nation with these transportation systems of the future. We need continued congressional funding of this. Ongoing funding is needed to complete Guidestar's tests and also to launch new tests which can only be evaluated in a test bed such as Minnesota's extensive infrastructure. Minnesota's Guidestar is not only providing Minnesotans with an excellent transportation system, but it is a national resource of strategic importance.

Thank you for this opportunity to talk about Minnesota's program. We appreciate your support and hope we are living up to your expectations.

Ms. COLLINS. Thank you very much for your testimony.

Ms. COLLINS. I would like to ask the three of you, many of the ideas, systems, application also occur in metropolitan areas, and it seems appropriate for MPOs to be involved in the deployment of ideas technology.

What role are the MPOs playing in your State? Are they involved in the ITS planning and funding decision making and in the coordination of ITS applications within the corridors?

Mr. Kelly first.

Mr. KELLY. Yes, Chairwoman, they are. ADVANTAGE I–75 is a little unique. It involves several States and has a corridor running

throughout the country. But also individually within those States, there are traffic management systems in the urbanized areas. In our case, the northern Kentucky, Cincinnati area there is a traffic management system there which is very actively involved with the NPO to develop input into the ADVANTAGE I–75 project, and also using work for ADVANTAGE I–75 to help them in their management system. So we are very much involved in that.

Ms. COLLINS. Are your MPOs, do they reflect the population representation on your MPOs?

Mr. KELLY. I am not following you.

Ms. COLLINS. Well, I have several studies that show MPOs do not adequately reflect the population, such as L.A. not having enough representatives, they may constitute 25 percent of the population, but only have 2 percent. Those figures are not right, but only have 2 percent representation on it.

Mr. KELLY. I can answer for Kentucky.

Ms. COLLINS. That is what I am asking you.

Mr. KELLY. Yes, they do, very much so. The composition of the MPOs in the Commonwealth of Kentucky is based, heavily based towards the urbanized area. In fact one of ours is an urban county government, so it has virtually 100 percent.

Ms. COLLINS. Thank you.

Mr. van Loben Sels.

Mr. VAN LOBEN SELS. Our MPOs are deeply involved. In fact in several cases, they are the sponsors of demonstration projects and developments of these programs, and actual implementation, and particularly their member counties are contributing staff, money, and resources, matching it with State funds, and competing for the Federal funds. Most of our programs are in fact essentially MPO based.

So they are very much a part of the program.

Ms. COLLINS. Do they reflect the population?

Mr. VAN LOBEN SELS. I can't tell you exactly how the voting goes inside the MPO.

Ms. COLLINS. I mean representative membership.

Mr. VAN LOBEN SELS. Generally by cities and counties, counties. For instance, in Southern California, SCAG is a membership of several counties.

To the extent that each county has a vote, it is a large urban area essentially, but, to my knowledge, they don't have a vote that is weighted by population. But I will have to verify that, and I would be pleased to provide you details on that.

Ms. COLLINS. I would like the information from the three of you. I think California was one of those that was used as an example, where it was not—the membership on the MPOs were not reflective of the density of the populations they represented.

Mr. VAN LOBEN SELS. They are an association of governments as opposed to a population based.

Ms. COLLINS. I won't ask you, Mr. Stehr, since you are going to give it to me in writing.

[The information referred to is attached to the prepared statements of the witnesses.]

Ms. COLLINS. Mr. Kelly, you mentioned that the Federal Government is supplying 80 percent of the $12 million for the operational test. Do the truckers pay any money?

Mr. KELLY. The trucking industry at this time, it is on a very limited basis, as I said earlier, a demonstration basis, but they have made major commitments to add equipment to their vehicles. We are paying for the equipment, but they are paying for the operation and ongoing cost and installation cost, which balances out equally on that.

Ms. COLLINS. Will they continue to do that after the two years or will you continue to furnish the truckers with the equipment, or will that be their responsibility?

Mr. KELLY. After the completion of the test, we haven't made a final decision yet, but it is the recommendation of the policy committee at this point that because of the low cost of the transponders, it is about $75 each, and the infrastructure of the system will be in place, the basic cost is for the transponder of the operation of it, the trucker should pick that up, and they seem to be supportive of that.

Ms. COLLINS. You say you would like to continue this project after the two-year operational test. Have you considered how you would fund it?

Mr. KELLY. As I said, we would expect the operators who participate in the program to pay for the transponder costs. Obviously we have an ongoing interest in operating weigh stations to protect our system and also to collect any fees that might be owed to the Commonwealth. So we see it as being a partnership continuing, but the truckers bearing the cost of the ADVANTAGE I–75 project.

Ms. COLLINS. Mr. Stehr, you used the highway advisory radio system in Minnesota that uses a regular FM radio frequency, a station that has enough power to broadcast throughout the major metropolitan area.

In most cases an advisory radio is limited to a 10 watt station that has a range of only three miles. Do you find your more powerful station allows you to do things that highway advisory radio and a series of 10 watt stations would not allow you to do?

Mr. STEHR. Madam Chair, yes, we do. Wide area broadcasts through a more powerful station simplifies deployment. You don't have to put up antennas and try and synchronize those. You overcome the technical problems of overlapping broadcasts. We can reach the whole metropolitan area through one station. And there is a tremendous advantage in cost here.

We had to add a $10,000 device in order to convert our messages from the traffic message center. It would cost many times to do that with small, low wattage broadcasts.

I think the importance of the Trilogy project is not the technology used to broadcast. It could just as well be a cellular phone or a satellite or anything else. What we are putting in place is the database, the methods for compiling of the information, and the public infrastructure.

If we have to add another $10,000 device to support a system that Ford may use that comes off satellites, it is not a big public investment.

Getting the data together, getting the devices in the vehicles is the big investment.

Ms. COLLINS. Thank you. Mr. van Loben Sels and Mr. Kelly, do you now use higher, more powerful stations?

Mr. VAN LOBEN SELS. At this time we have not explored that. We find that changing travel conditions along our highways, particularly in the larger distances between our cities, it is useful to have a tailored message for that stretch of highway, and then we transmit it to that particular repeater, and so have a tailored message. And that is the route we are going at the present time.

Ms. COLLINS. So you are not looking for the——

Mr. VAN LOBEN SELS. Not to my knowledge.

Mr. KELLY. We are not either.

Ms. COLLINS. Mr. Baker.

Mr. BAKER. Mr. Loben Sels, I want to thank you for reducing the overhead of the central office and getting this technology out in the field, both in the technology area and the day-to-day decisions. This is one which we get modernized, and you are doing it. I would like to thank you.

One question outside the realm of this particular hearing, you had a year ago a rather tragic earthquake and a speed up in repair of bridges and earthquake-damaged facilities to the point where you saved a lot of money that the Federal Government was going to spend in California.

How is the retrofitting of some 2,000 freeway bridges and other bridges in California coming, and what can the Federal Government do to make it—and remember, you have only one minute to answer—what can the Federal Government do to facilitate averting the next disaster?

Mr. VAN LOBEN SELS. The retrofitting of our State's bridges, those not built to modern-day standards, is a priority of our program. Retrofitted bridges did survive well in the earthquake with no major damage. Modern bridges built to modern standards, the same. So we have about 2,400 bridges that need to be brought to standard. California is committed. We are going to spend hundreds of millions, if not billions of our funds, to do that as a priority, because it saves lives and it saves money. It is cheaper to retrofit than to replace in the next earthquake.

At the same time that is a great economic challenge to us, and any help the Federal Government can make in ensuring that the funds that are available, particularly those in the Los Angeles area that were earmarked for emergency relief, that we ought to be able to retrofit the bridges in that same immediate area so that we can protect our joint investment next time the earthquake happens.

Mr. BAKER. We allocated a certain amount of money for repair and apparently the estimates and the speed which the work was done left some money left over. If that money is allocated for retrofitting for emergency repair only, would you be able to come up with your matching share?

Mr. VAN LOBEN SELS. We would be prepared to match and we would welcome the help.

Mr. BAKER. Is there any way, if we don't allocate the sum of $500 million that was saved by speedy work, is there any way the State could retrofit those 2,400 bridges?

Mr. VAN LOBEN SELS. Only with great pain, and we will do what needs to be done, but it will takes us longer and it will have a greater impact on our regular program.

Mr. BAKER. So you would scrap the process that all States have and spend money on the retrofitting, not knowing where or when the earthquake is going to hit, tying up the State and making November a very unpleasant day for those of us who serve you here?

Mr. VAN LOBEN SELS. I understand.

Ms. COLLINS. I thank you. Mr. van Loben Sels, reading your testimony, I am very pleased to see that you are speaking of now—special attention to the rural application of ITS. You are right, they have some very special needs, as you say. You say, what is it, the weather, hazardous weather, dust, fog, low visibility and the like.

I think that is going to be key for raising revenue to pay the cost of ITS, to make sure that in servicing all segments of a State, not just, say, an urban or metropolitan area, but also a rural area.

Mr. VAN LOBEN SELS. Madam Chair, I couldn't agree more. In fact there are great opportunities for May Day type signals, if you break down in a remote area, to be able to call for help, for many of—and I have forgotten the exact statistics, but a substantial portion of our fatalities on our State's highway system are individual cars running off the road and hitting a fixed object in a rural area.

And we need to attack this problem. And if we can do so with warning devices which alert the driver that they are drifting or they are falling asleep or whatever, these are the kinds of payoffs to a substantial portion of our population. And it also of course increases the support for this kind of investment, so it is not only the cities that are benefiting, but the entire State.

Ms. COLLINS. Thank you very much. We have a 15-minute vote followed by a five-minute vote, so I will recess this committee hearing until 12:45.

[Recess.]

Ms. COLLINS [presiding]. The Subcommittee on Investigation and Oversight is now back in session and we are ready for panel three.

On our third panel, we have Mr. Michael P. Bolton, General Manager of the Capital Metropolitan Transportation Authority, Austin Texas; and Mr. Robert G. MacLennan, General Manager, Metropolitan Transit Authority of Harris County, Houston, Texas.

Gentlemen, would you please stand and raise your right hands.

[Witnesses sworn.]

Ms. COLLINS. Mr. MacLennan, you may proceed.

TESTIMONY OF ROBERT G. MacLENNAN, GENERAL MANAGER, METROPOLITAN TRANSIT AUTHORITY OF HARRIS COUNTY, TX, AND VICE PRESIDENT, BUS OPERATIONS, AMERICAN PUBLIC TRANSIT ASSOCIATION, ACCOMPANIED BY MICHAEL P. BOLTON, GENERAL MANAGER OF THE CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

Mr. MACLENNAN. Madam Chair and Members of the subcommittee, I am Bob MacLennan. I am Vice President of Bus Operations for the American Public Transit Association, General Manager of the Metropolitan Transit Authority of Harris County in Houston, Texas, and a member of the board and executive committee of IVHS AMERICA.

I appreciate the opportunity to comment on the Department of Transportation's intelligent vehicle and highway systems program as it relates to public transportation. And having said that for the first time, I would immediately add APTA's voice of encouragement to the name change to intelligent transportation system as a better descriptor of that system.

I am accompanied by Mike Bolton of our neighboring city, Austin, and its Capital Metro. Our remarks will highlight the written statements submitted for the record.

First, we would like to thank Congress on your leadership in passing the Intermodal Surface Transportation Efficiency Act. Although a few years old, its effects are far-reaching and important today as we discuss this subject. Prior to the passage of ISTEA, the tendency in transportation as some of us perceived it was for the State Department of Transportation to plan their freeways, the counties to plan their highways, the cities to go about their traffic management tasks, and the bus and train agencies to plan their routes all in isolation. No more.

For example, in Houston, we all plan together how to bring the best transportation plan to the region, and we work closely together as active voting members of and through the metropolitan planning organization for our region to ensure proper balance and prioritization of our efforts.

Houston Metro plays a key role in that planning process so we are implementing our IVHS plans as a total program for the region. Not every transit agency is as linked to the total transportation program of its region today—both of us will comment on that—but the time in fact has passed us when we can be independent of the remainder. We must, in fact, work together.

Transit has an increasingly important role to play in implementing the Clean Air Act amendments of 1990. One of the more ecologically sound acts any citizen can take is to car pool or van pool or take a bus or train. And we transit agencies will attract more riders into our systems by implementing more and improved IVHS technologies.

Metro has been the recipient of important Federal support as we come through the electronic age. Portions of Houston's developing regional bus plan make significant use of IVHS technology. And because of your support, Houston Metro and the State Department of Transportation are embarking on an important IVHS experiment to develop the smart commuter already mentioned by FTA Administrator Gordon Linton this morning.

As part of the Senate Commuter Test Project on the north side of Houston, we are linking electronic communications systems into homes and into downtown offices to alert travelers to real-time traffic conditions. Commuters will very soon be able to find out the current conditions, the traffic status on the route, congested or not, weather and construction problems, and when the next bus will arrive at locations near them. That way they can make an informed choice about whether they should drive a car in traffic, perhaps on that day knowing that there is an uncleared wreck on the freeway or car pool or board a convenient bus, each of which can speed past the traffic jams to their jobs by our various separated high occupancy vehicle lanes.

As part of our federally assisted regional bus plan, Metro will be making the trips of these bus riders much easier. For example, as they wait on the buses at a transit center or park and ride lot, an electronic design will tell them when the next bus will actually arrive based on real-time location information from our automatic vehicle location system as opposed to looking at a schedule and hoping that it is on time.

On many of our buses we already have electronic registering fare boxes that can accept decrementing fare cards that subtract the appropriate fare for that route and tell riders how much remain on their account. You are already familiar with that on your own Metro system here in Washington.

Our automatic passenger counter will have registered in which location they boarded the bus and as they approach the stops at their destination, our annunciator system will call out the name of the next stop. Electronic signage will show the hearing impaired when their stop approaches.

As Houstonians ride on buses or car pool down our HOV lanes, numerous IVHS enhancements in the lanes themselves and on our buses will facilitate more efficient travel, to include sensors on the lanes that alert controllers of traffic speed and density and possible breakdowns, closed circuit TV to evaluate traffic problems, and our smart bus will automatically monitor engine conditions, like brake conditions, air-conditioning output, and automatically alert both the driver and the garage before problems become critical.

All of these bus enhancements will be linked with an industry standard connector, the J-1708. This standard was developed by the APTS committee of IVHS AMERICA under the leadership of one of Metro's employees, Bill Kronenberger. It is an important agreement soon to be adopted across North America.

Standardization of these intelligent vehicle technologies is very important and we are now getting it thanks to such works sponsored by the American Public Transit Association, IVHS AMERICA, the bus industry, and support by the Federal Transit Administration. We enthusiastically encourage more of that kind of support and welcome the guidance of the FTA. Equally important, standardization should bring the costs of this technology down.

One of the interesting intelligent vehicle technologies being sparked as a spinoff from our defense industry is the automatic vehicle locator I mentioned earlier. Our automatic vehicle locators will tell the dispatching office just where all of our buses are. Knowing where our scheduled buses are has an obvious advantage to all of us. Our paratransit vehicles transporting the handicapped do not drive routine routes and we schedule those pickups on the fly as they are moving along their routes, which means we change their routes as they are driving.

In all of these cases, it gives us, again, an obvious advantage to know exactly where those buses are so that we can directly encourage them to use the most efficient route to get where they are going. All of this will show up on screens in our greater Houston Traffic and Emergency Management Center, our central control facility. This central control facility, which is a joint project of the Texas Department of Transportation, Metro, the city of Houston, and Harris County, will also be able to use the vehicle locators on

our buses to tell how smoothly the traffic is flowing on all of our major roadways.

It is already doing so on our freeway system as we enter the early stages of implementation.

From that traffic management center, we will be controlling the traffic sensors and television cameras that monitor traffic flow on the HOV lanes and freeway main lanes as well as electronically controlled ramp metering. Automatic message signs will alert car poolers to the opening of the high occupancy vehicle lanes and other traffic information.

In addition, as part of our regional bus plan, with Federal help, Metro is installing intelligent traffic signals on key arterials throughout the area. Since most of our buses travel on arterial streets in stop and start traffic, their speed will be tremendously facilitated by these signals. Obviously, all of the traffic on those streets benefits as well.

Over on the west side of Houston, another portion of the smart commuter plan will soon implement an instant car pool matching system. Metro has been offering car pool matching since its inception, but we have recently installed as part of the regional bus plan a much more powerful computer and software to facilitate this portion of the smart commuter plan. Interestingly, the software developed by this plan was also developed by a defense contractor who developed the program for the guided missile program.

Why is a transit agency developing and matching car pools and van pools? We are a very different agency, but we think we are a transportation agency, and we feel that it is appropriate that we work throughout the gamut of transportation activities.

Multi-occupant vehicles take advantage of our now 63-mile various separated HOV lane network for commuter travel. While congestion has risen in other cities, it has declined in Houston consistently over the last 12 years, and our HOV lane network has been cited as a major reason for that decline. Congress, along with the State Department of Transportation, has helped Metro significantly in the development of this extensive network. When complete, we will have 104 miles available for use of multioccupant vehicles during this decade. Our per passenger trips are low in cost and we think this has been an excellent government investment for multimodal transportation.

I believe there is value in Houston's story. We are a transit agency that has taken a leading role in advancing true coordinated multimodal transportation in our region. But many transit agencies are struggling financially to keep basic mass transit operations moving, as FHWA Administrator Rodney Slater mentioned earlier today.

IVHS has a cost for any agency to make, yet it is an excellent way to make transit systems attractive to new riders. We hope you will continue to place an emphasis on moving people and goods and services and, where possible, without significantly increasing the vehicle miles traveled.

Multioccupant vehicles are a part of the solution to the pollution and congestion that threatens so many cities. Advanced public transportation systems, a key part of transit's side of IVHS, needs the funding support in the development and standardization of

these technologies. We at APTA and IVHS AMERICA have a responsibility to educate the public on the value of these technologies and what they can do to make better transit systems. We are trying to do that. We as transit professionals need to open up our minds to cooperative transportation development. We are trying to assist in that as well.

We ask for your support for increased standardization, increased research, and sustained and increased funding for these programs, and I thank you very much for the opportunity to speak to you.

Ms. COLLINS. Thank you very much.

Mr. Bolton.

Mr. BOLTON. Madam Chair and Members of the subcommittee, I am Mike Bolton, General Manager of the Capital Metropolitan Transportation Authority in Austin, and I have been so for the past six weeks. I am also a member of the IVHS AMERICA Coordinating Council and the chair of the Advanced Public Transportation System and Committee.

I appreciate the opportunity to comment on the Department of Transportation's IVHS program as it relates to transit. My remarks will be about APTS, transportation systems in the U.S., as well as some things about our global competitors; what they are doing in the area and the need for our coordination of research activities.

In the written statement supplied to the committee, there is a suggestion that many in the transit industry are skeptical about IVHS. I, for one, am not. Frankly, I believe the transit industry should do more to utilize ITS technology. It is my hope that my colleagues will come to embrace the use of technologies in much the same manner as I have.

I understand Chairman Mineta's concern about the slick salesperson relative to technology, and it is partly that past experience with defense contractors in the 1970s that is the basis for the skepticism of much or many of my colleagues in the industry. So I think what you will see from the transit systems is that they are proceeding prudently.

Advanced public transportation systems can increase transit ridership if appropriately deployed. Many people do not use public transportation partly because they have poor access to information about routes and schedules. People can walk out of their door, they can see their car, and they know where it is. They have no idea where the transit system is. Part of that has to do with how we have presented information, the various venues we have used, and our focus on customer service.

Riders are deterred because they do not know if the service will be reliable. If you look at most reports from most transits systems, they will report very high on-time performance. Yet, if you do a sampling of riders, you will hear in them that it is very difficult to rely on the service. The difference is the transit systems measure performance at the time points. The customer measures performance at the bus stop.

The new technologies will allow us to route and schedule our buses so that effectively every bus stop becomes a time point. It is a customer-focus approach. Smart transit corridors should revive, or relieve the congested highway infrastructure, especially when

fixed route and HOV vehicles are given an advantage over the single occupant vehicle.

Advanced public transportation systems can address these problems by improving the flow of information. And, again, there is a way of doing that in terms of getting information to people before they leave the home.

You heard the previous panel talk about ATIS. This is one of the things about ITS that really begins to make sense. As something gets developed as part of one part of the program, there is a cross hybrid situation type of thing that can go on. So if we develop an appropriate system for advanced traffic information system, we can take the traffic out and put transportation in. We can give people information in their homes via cable TV.

An earlier question was that at the local level most cable TV stations or most cable TV franchises have some sort of a local regulation. Transit systems as public entities can use those public stations. There is also an opportunity for public-private partnerships in terms of the sharing of a particular channel for transportation during the day and other programming during the evening.

When I was the executive director of the Ann Arbor Transportation Authority, where I served for 12 years, we attempted to put in a vehicle location system back in 1987. By the end of 1992, we had finally figured out it was not going to work. It was a case of where the technology worked well in a single occupant vehicle but did not work well in a bus. It was also the basis for us making a very interesting decision, which differentiates the program in Ann Arbor from many other systems yet discussed.

In Ann Arbor, the bus is smart. It is the bus that has its routes, its schedules, it knows where it is at all times. We affectionately refer to it as the self-actualized bus, but it is an issue that it is something we learned. The central computer capabilities are massive if you try to do all of these mapping and scheduling issues at a central computer. The other thing is it ties up an awful lot of airwaves that are very critical. So what we did was we made the smart bus operation in Ann Arbor one that would utilize an onboard processor.

The other thing we did in terms of the control system was design it so that the information that came in was easily disseminated throughout the organization, and also to the public via cable TV or kiosks. And in reference to your question earlier about where do you put the kiosks, shopping centers, major employers, wherever you can possibly get them. And, again, public-private partnerships. There are people that are willing to share, to advertise on that space with you.

The smart card fare collection system is more than that, and I will come to that in a little more detail in a minute. The on-board system monitors the performance in regard to the route location, speed, and the status of mechanical systems. It allows control of on-board electronics, such as the fare collection system, the destination, signs, and the Americans with Disabilities Act displays.

Bob MacLennan was a little modest in terms of the work that was done by one of his staff members, Bill Kronenberger, who did an outstanding job for our committee in developing that standard.

The on-board system enables the smart bus to communicate with the central control system, which integrates bus fleet data for coordinating supervision, and provides real-time transit information to the public.

A critical issue—one of the things you will probably hear in other areas is that we will have a bandwidth and a frequency issue facing us in the future. As a matter of fact, the FCC is already hearing comments on it. By reporting only exceptions, we limit the need for bandwidth and frequency utilization.

The smart card fare system provides a method of payment for transit and parking as well as special services. The card that Administrator Linton showed you earlier is essentially a fairly—is a very, very good card in that sense. The smart card also becomes an electronic wallet allowing users to pay for newspapers, snacks, coffee, whatever.

The other thing we discovered in talking to people was that it also allows us to link with other programs, other Federal programs: Third party payers. Health and Human Services (HHS) has over a billion dollars in transportation money in its budget. This would allow a way to be able to record and track trips for HHS clients. Social Security also has transportation money for SSDI and various other things. The card could be used to do third party billing to pay back or as a means of providing a service to those folks so that they did not need to worry about having a bank. They would be able to go and get their credit level or their debit amount put into the card.

The ATA is now moving to implement several demonstration technologies on a broad scale, and right now it literally is in the deployment. We went through the bidding process. And let me just make one other comment relative to that. In order to implement technologies, FTA and other people will have to find a way to use some of the procurement technologies that have been available to NASA, to the Coast Guard, and DOE, and various other people over the years. Because in order to implement technology, low bid is not going to get you there. Negotiated procurement is not going to get you there.

I will be doing more of this now that I am in Austin because we just happened to be planning to buy both a radio system as well as a new fare box system, so I get to go and play with a whole new round of issues.

In spite of the promising potential for APTS to improve ridership, the U.S. does lag behind in some areas of development. The European Community has a working group, CED–27A, that has been working on standards for at least two years. We have just gotten involved through an ISO working group, ISO–204. Working Group 8 is public transit. We are only a year into this. They already have a document and they can come in and present as essentially an international standard.

In Europe and Japan, the public budgets have been devoted to research and development of new transit technologies. Let me be frank about this, the Europeans, I think, are much further ahead of us. And I have been to Germany and I have been to Japan. The Germans are ahead of us. They have been at it for much longer than we have. The French are ahead of us.

I don't think the Japanese are as far ahead as people think they are. They have a very good fixed base system. They have a very good system in Osaka, in Tokyo, and one other city I can't remember the name of right now that we saw. But it is essentially telephone lines. It is a fixed base system.

Most of what we are talking in the U.S. is probably either going to be GPS or one of the other newer technologies. So we may be a little further ahead when it relates to that. But in terms of customer information, they do a much better job disseminating.

The IBIS standard in Germany has been in place for nearly 10 years and they are already beginning to move to the next generation. They are moving to what is essentially a controller area network, at least the initial phase. As a customer of FTA, I believe that FTA's advanced public transportation system research program has been hobbled by a lack of sufficient staffing and funding.

Ron Fisher and the group that Administrator Linton referred to earlier have done a yeomen's job. They have done outstanding work with very limited resources. They have done with 2 or 3 people what Federal Highway has done with 40 or 50 people, and it is just remarkable, but there is a limit. And I think that people need to be aware of that.

So that transit—IVHS research—and I stumble over it too; I like ITS much better than IVHS—so that the research does not occur outside of the transit industry, we do support an increased role by FTA in coordinating research activities and in facilitating standardization.

The other thing that I think we need to do is to leverage the performance of our various other efforts. USGS is doing some very interesting stuff on spacial database, on mapping. Both Oak Ridge and Sandia labs have done excellent work on that. If you ever get a chance to see the Sandia, what they call the star plan, or it is their system for tracking nuclear waste and nuclear weapons, it is 28 different spacial databases that are just overlapped and it is remarkable. We have to find a way to be able to overlap the databases that are based on tiger files from Census, the GIS stuff that has to do with the local mapping and all that sort of thing. We have to be able to find a way in order to do that in order to make these systems work the way that they should and could work for us in the future.

Finally, I do want to thank you for the opportunity to be here. My staff, both my old staff and my new staff, say that trying to get me to talk about ITS in five minutes is a rather remarkable task, but you guys are my witness, I actually have done it. And I would be happy to answer any questions. Thank you very much.

Mr. BORSKI [presiding]. Well, we very much appreciate not only your testimony but the brevity of it, and perhaps we will get into some questions and you can expand a little further on it if you wish.

Let me ask each of you this, at our first hearing, GAO reported that in 1992, fiscal year 1992 and 1993, about 9 percent of the IVHS program expenditures have supported the development of technologies and enhanced the convenience and accessibility of the public transportation's systems. Are current resources adequate to meet the transit industry's needs?

Mr. MACLENNAN. I will start by saying that we certainly would like to see the amount of support at least sustained but increased, if that is possible. We recognize that there is a prioritization that is necessary, but there is an awful lot of potential to come out of the ITS technologies and we do think that the concept of providing strong support for our involvement, not just in the research but also in the initial implementation in the operational test, would be money well spent.

We certainly also encourage the development of such agencies as the joint office that has now been begun in the Department of Transportation. We think that this joint look, by all of the combined parties that have some responsibility in the movement of goods or people as opposed to what could otherwise become very limited perspectives is very important. Particularly to those of us who in the field are trying to spread out into areas that are not traditionally ours.

In our case, we are not a mass transit alone agency. We build highways, we build streets, we run a traffic management system. If you are stopped by a policeman on a freeway system in the general Houston area, odds are it will be one of our police that have stopped you.

That is a pretty broad role for a transit authority. And if we are going to get into the true transportation business and look at the most efficient way to do it, this combined approach, I think, is essential with strong support, particularly the financial support, because many of our agencies are, as you have heard earlier, quite strapped just keeping their mass transit activities going. I think anything you can do for it will be well appreciated.

Mr. BOLTON. I would follow up on that just by pointing out that one of the things that has helped me in the past four or five years to look at this whole issue is to take more of a systems approach. The questions earlier about the role of the MPO and the utilization of limited resources, I mean you talk to almost any transit system, except perhaps the two sitting before you, and most of them are really, really strapped for cash.

One of the things that happens is that the land use, the local land use issues and the utilization of current funding dollars, transportation dollars, even though we are far into the ISTEA process, we still have an awful lot of people that are still thinking very, very modally, and the solution is not to look at a transit corridor as an alternative to a lane mile of traffic. It is to figure out how do we get the lane mile of traffic.

The other thing is, in terms of trying to find a way to leverage the limited dollars, whether that is through leveraging cities or the empowerment zone concept, which is already being pushed forward—and I know it is not in the purview of this committee, but it should be in the area of somebody to stress or to look at—we need to look at the Tax Code and some of the things in there that will encourage urban redevelopment. Because if we get the urban redevelopment, then the traditional transit systems can do what they do and do fairly well. Right now they are trying to do both. They are trying to deal with the inner core that still needs to be served and yet at the same time work on the inner city, and that is stretching them.

So now to come in and put a new set of technologies in place is going to be very, very difficult for them unless they can use—unless they can trade dollars off somewhere in the process. That is one of the reasons why I mentioned HHS as someplace that perhaps, because if we can start to look at the same trip that takes a disabled person to school, if that same trip takes somebody, perhaps a senior citizen, to a doctor's office, the technologies are there to make that—to make those systems work.

The problem is that right now we do not see the real value because we are still talking about efficiency. And with all due respect to some of the other people that have talked today, if you look at what our global competitors are doing, they do not talk about the efficiency of a transportation system, they talk about its effectiveness. We have to talk about the effectiveness of the system, and I think when we do that then we change the points of dialogue.

Mr. BORSKI. How much of an increase in transit ridership do you think is possible by using ITS technology?

Mr. MACLENNAN. I would hesitate to put a number on the table but, I think you can see—I think we could say it would be significant over time. I don't think it will happen in a day or two. I think there is going to have to be some time period for the systems to mature. But I do think the results would be relative to the monies that are put into transit in general would be very cost effective. I think you would get a good return on the dollar.

Mr. BOLTON. Mr. Chairman, I am faced with a rather interesting situation in Austin. I have been asked to look at building light rail there into a community that is going to probably double its population in the next 20 years. It has already increased in the last 10 years by almost a hundredfold. So one of the things that I know is, even if we started building the light rail line tomorrow, which we are not ready to do, we are not going to be able to deal with that growth. I also know that I–35 is already at an excess capacity. And with NAFTA, it is not going to get any better.

We have to look at new technologies, whether it is the ability to preempt signals or advance signal timing in order to move buses through faster. We have to be able to look at ride sharing, dynamic ride sharing in some cases in order to be able to do that. It is not a question of how much we are going to increase it, it is a question of how much are we able to transfer and how fast can we transfer.

I see the technology as allowing us to make that transfer much, much faster than traditional old methods, and it is one of the reasons you will hear me talk about a transit corridor in much the same way as my highway colleagues would talk about a lane mile of traffic.

Mr. BORSKI. Do you think transit applications of ITS are given sufficient support from FTA and DOT?

Mr. MACLENNAN. I think they are getting good support from the FTA. We would certainly encourage additional support, particularly in the areas of standardization, standardization support and any encouragement that could be provided from the FTA towards broadening the perspective of the transits agencies to look at what might earlier have been considered nontraditional solutions to the movement of people or goods. I think that kind of support would be very important to us.

These are multimodal solutions we are looking at. And it requires that all the way through the system we not try to build particular views and say that something is not in this view, it should be in another view. I think that the joint program office that has been developed is a great step forward in this concept of looking at things beyond the normal traditional lines, but I do think, particularly the encouragement and support for standardization would be critical.

Mr. BOLTON. I would share that need. The only concern I would raise with the joint program office is if somebody is going to be supplanted from FTA to this joint office, to support this joint office, that there should be some way of making sure that the limited staff that has already been there is replaced. It is just the whole question of research and development of public transit has been woefully lacking, I believe.

Mr. BORSKI. Gentlemen, you spoke in your testimony of the need for legislation giving MPOs a stronger role in coordinating ITS in transit efforts and a need for full funding of MPO planning functions.

Could you elaborate on what that legislation might specifically do, and what do you mean by full funding?

Mr. MACLENNAN. Do you want to start?

Mr. BOLTON. I guess I would start on that.

In terms of the current configuration of both the STIP and the long-range plan, it essentially continues to have us do things pretty much the same way we have in the past 35 years. There is more transit representation. There is the whole notion of competing for flexible funds and STP funds and CMAQ funds in the current process, however, there is not much understanding at the local level as relates to the ITS technologies. And, again, because there are limited dollars, people tend to go with what they know rather than something that they don't know.

Again, being very familiar with what has gone on in Michigan, the Oakland County Troy Deployment, that has been an excellent test bed for people to get a look at the technologies, but I think it is also safe to say that technology when it was implemented part of the reason that that particular technology was chosen was because it was a safe technology. It had already worked pretty much someplace else and was relatively easy to transfer.

The MPOs currently do not have a sufficient understanding of what these technologies can do. The other thing that limits in some cases is if you want to do advanced signal timing in a number of systems that are part of the old primary network, because they were State trunk lines, a State like Michigan, for instance, does not permit the preemption of traffic signals except for emergency vehicles on a State trunk line.

Those are the sorts of things that if we are going to move forward we have to be able to waive or suspend some of those regulations in order to be able to test some of these technologies.

Mr. MACLENNAN. I would further comment, I would support what Mike has said. I would further comment that MPOs today are in a transitional period. Earlier, a few years back, MPOs held a position where they traditionally would simply take the plans of the highway department or the plans of Metro or what have you and

say, fine, and pass them on. Now they are in a position where they obviously have to take a stand on those plans and prioritize them and balance monies between them and, obviously, as is the case most anywhere, there is not enough money to go across the board to each of these.

I think the educational program, that is just in its early stages today, of the general public, is essential to MPOs as well. There were some comments earlier today on the makeup of MPOs. In our particular case, the MPO covers Houston as the major city; Galveston, the next larger city; but eight overall counties and a lot of rural areas, and there are 23 people on the MPO. You cannot get it much larger than that and still have a reasonably functioned committee.

Yet, on the other hand, if you talk in terms of population, where the great bulk of the population is in the city of Houston, if you actually set the committee up so that it measured the population or mirrored the population, it would be very difficult to get representation for the remainder of eight counties and a number of other smaller political entities.

So the composition of the MPO, to some extent, is critical. In our case, it is a compromise between the two. It does not mirror the population directly, but Houston has more representatives than others do.

In our case, the makeup of the committee has changed. In the past, it used to be for the great bulk of technical people that were on it. Now, it is mostly politically elected folks that are moving into the positions of voting members. And it is a very protective move that you can see taking place.

There is an education process that is necessary to go along with that. It is not quite the same to explain to the committee today what the technical advantages of one project over another project are, particularly if there is some parochial interest that is also associated with one of the projects under investigation.

So education is extremely important, and I would think as you looked at potential legislation, rather than give the answer, I would just as soon leave you with the explanation: Consider an MPO that is made up as ours is made up and what sort of guidance do you think would be appropriate for them so that they can effectively balance the political, politically important issues with the technically important issues that are placed on the table in prioritizing projects.

Mr. BOLTON. If I could, just to sort of come back for a second, because one of the parts of ISTEA is that there has to be a congested management plan just as there has to be a transportation public management plan. One of the problems that just about any MPO today is going to have is whether the congestion management plan is developed at the State level as is being done in Michigan or if it is going to be developed at the local level, there is not really—because of the way we do models, because of the way we do modeling for our transportation planning, the ability to estimate the impact of ITS technologies is almost negligible. The reason being that people tend to use the previous—for population, they tend to use the three previous Census reports. They tend to use the most recent or the past five years for construction, or something of

that sort. The gathering of the traffic flow data is generally done on a 24-hour grossed-up number rather than on the certain systems at certain times, where you can go and look at the individual hour.

I mean, if you ever get a chance to see Guidestar, to see their control center, to see what they can do in terms of looking at the performance of the lane, I mean it is absolutely incredible what they are able to graph there. That is the level of detail that does not get brought forth in most cases to the planning that is really going to be needed for the future development. The technology is there, but the ability to implement it or to expend funds for it is severely limited because most people are not aware of the Guidestar program. They are not aware of the power of those tools.

Mr. BORSKI. Are we moving fast enough to set standards for ITS technology in the transit area and what problems do you foresee if standards are not set properly?

Mr. BOLTON. I guess I would jump in on that since my committee was one of the ones to have the success. We would not have had the success without Bob's staff and Bill Kronenberger, but it is something we have been looking at in public transit, because one of the problems that we had with the on-board vehicle components, because we have such a small industry, and the fact that I think you are all aware that even our bus manufacturers are not exactly permanently stable right now, but imagine the bus suppliers, the ability for them and for people to come in and bid a project. If there are standards in place, it becomes much easier for us to get the competition.

Let me come back to that IBIS box I mentioned earlier. The German—because the Germans have had the VDV standard, which by the way was developed by the transit—the equivalent of APTA in Germany is VDV. It was developed by the users and then it was put out and people came in and bid according to the standard. There are five manufacturers of that, that IBIS box, that control system.

In the U.S., we have one, essentially one major fare box manufacturer; we have one major sign supplier; we have one major door manufacturer. We have limited ourselves because we did not have the standards. And I think that with the standards we will be able to increase competition in order—and that, of course, would keep prices down.

I think we are moving at a prudent level when it comes to standards, because one of the things that we have to do is, again, in transit, is we are going to have to build off somebody else's standard and find the standard that most appropriately fits transit's application, whether that is a society of automotive engineers' standard or whether it is an IEEE standard or whoever else that we eventually come to.

So I certainly, from my point of view, and from the work my committee has been doing I think we are moving at an appropriate level, but we do need to improve standards.

Mr. MACLENNAN. I would concur and simply state I think we need to continue the emphasis on standards and continue to show support for the development of standards at the Federal level, but

I do think we are moving at a reasonable pace for where we are today.

Mr. BORSKI. Mr. MacLennan, what proportion of bus symptoms do you expect to be equipped with electronic signage that will tell passengers when the next bus will arrive?

Mr. MACLENNAN. In our particular case, we would intend to put that electronic signage in at our transit centers and park and ride lots. Obviously, we have 10,000 bus stops in town. We are not going to have them at 10,000 locations, but probably upwards of about 50 of the better transits, larger, more utilized transit centers and park and ride lots would have the electronic signage as well as some of the major activity centers, particularly places of employment. As was mentioned earlier, before folks even get to the bus, it would be nice for them to be able to get some information on the buses that we have running around town. So somewhere in the general vicinity of 50 at this point.

Mr. BORSKI. Mr. Bolton, FTA's testimony referred to Ann Arbor, Michigan's, fare innovation program where the local transit operator is implementing a smart card that can be used for the city's parking payment and bus fare payment system. Since you were involved with the Ann Arbor program before you took your current position, can you describe this program in more detail and explain how prices will be structured to offer incentives to use transit.

Mr. BOLTON. Primarily, we were looking at two phases. One was—we have almost shifted focus, if you will, from the city's parking system, the university's parking system. The University of Michigan discovered it was going to have to build a parking structure to support a medical facility of the hospital at about $20,000 a space. Just the building. And I think it was going to be at least a thousand spaces, and that adds up fairly quickly.

They came to us and said, look, we understand you are doing something with this smart card thing. We think we would be ready to move much faster than the city is. We want to be able to give our employees a pass, or work with our employees potentially for a pass, and we are going to pilot it at a particular structure. And what we will do is we will pay for—we will subsidize the employee's transit trips and then we will charge them at a differential rate for their parking permit for the structure, and it will be a lower rate in terms of what we charge them versus what we charge somebody who wants to buy the annual hunting permit—which is what the parking pass is affectionately called in Ann Arbor. That was one of the things we started to work with them on.

The rationale, the original rationale that would eventually come into play is that currently a transit pass costs $25. A monthly parking permit in Ann Arbor was at $16. Unless it was subsidized by an employer, it could drop a little lower than that. The idea was the more people that used public transit, the less we would charge them for parking. So if somebody currently was paying for parking at, let's say, $60, if they used transit for three days out of the week and needed their car for two days then you would only charge them $20 a month for their parking permit or whatever.

The important thing we discovered going through this process is that there are these barriers we put in place and they are screen barriers. A monthly parking permit is a convenience barrier. We do

not think about it that way but if I already have a parking permit, why in God's name would I want to ride a bus. And if I paid my $25 or $30 for my transit pass, I am going to use it because I do not want to—one other thing I should point out about transit, discount passes, and it sort of goes to the question that Congresswoman Collins asked about earlier. We discovered something very interesting about the socioeconomic effect of passes. We discovered that people on low income do not buy monthly transit passes, even though they are the people that would benefit from them. The reason is it is $25, pay now, right now. If you lose it, it is gone.

The smart card gets around that because once you have the card, you can add $5 or $10 or $15. And the other thing is you can add it when you get on a bus. So if you get paid and you want to add some money to pay for your trip for the next week, you can put $10 in the fare box, the driver pushes a button, adds the $10 to the card. If you lose the card, we know how much money was on the card the last time it was used. So you come in and say, hey, I lost it, and you put it on a blacklist, you wipe that card off the list of lost cards, out of the system and you put the money back in.

In the process, that is the sort of thing that we discovered as we started to work with the customer to see what it would take for them to use the card. And that is the other group that would use public transit, got this idea—one of the things you will find is that I am a shameless user of other people's great ideas, and Ajax Transit up in Canada had worked with the idea of a smart card for high school kids. They were able to shift a certain amount of the kids on to public transit.

It was a contactless card. Actually, it was a tag. And the kids attached it to their backpacks, and when they got on the bus, they turned their backpack, it went beep, and they got to get on. The system was smart enough to say it was going to debit a certain amount for either the to or from school trip.

If there was an activity, the kid still paid the student rate, but at 6 o'clock or 7 o'clock the kid's rate went essentially to a young adult's rate or whatever. On the weekends, if the kid had used the service during the week, they got a discounted rate for riding the bus on the weekends. So you built in some incentive.

And if you think about it, who are our future riders in transit? What do we do to most kids? In public transit, we give them a discounted fare during the school, and during the summer or on weekends we make them pay an adult's fare. This way you can start to segment your population in order to give discounted rides or begin to do some fairly targeted marketing at particular groups.

Mr. BORSKI. You mentioned you have stolen ideas from others. Are others stealing ideas from you?

Mr. BOLTON. Yes.

Mr. BORSKI. Good. How about Philadelphia, are they stealing any?

Mr. BOLTON. As a matter of fact, we have had discussions with Mr. Gambaccini and some of his staff.

Mr. BORSKI. Good. Glad to hear that.

The gentleman from California, Mr. Baker.

Mr. BAKER. Thank you very much, and I have enjoyed the information. And having seen British Columbia or Vancouver's Sky

Train and the honor system, an honor system backed up by some pretty large employees, I am kind of encouraged about the way we are going to cut the costs.

You mentioned if we are going to try a lot of these new technologies we are going to have to reduce some of our regulations. Maybe the Chairman knows what you are talking about, but could you be a little more specific? Where do our constant barrage of regulations get in the way of innovation?

Mr. BOLTON. Currently the 4220.1(a), which is the UMTA's guidance on purchasing, where we used to have to take low bid, we finally wised up and figured out what we were getting with low bid, and then we found out what it would do if we started to negotiate procurements. What we did for the acquisition of the system in Ann Arbor is we went back into the FAR. We went behind 4220.1(a), which is essentially the UMTA guidance.

We went to the Federal Acquisition Regulations and we found language in there that was used by NASA, or that was used by DOE, in order to be able to make the purchase of the new technologies, with the idea that you were not going to get somebody to come and bring forward a real good idea unless there was the possibility of some cost sharing. And part of the problem is when you say cost sharing between a public sector and private sector, somebody immediately thinks of kickback or something else. What we are talking about is a way to say to somebody, look, we are going to introduce new technologies. It is going to cost two-and-a-half to $3 million. We are going to go to the American taxpayer and say to that taxpayer, we want to buy this new system. It is unproven, but we want to be able to buy it. Now, how do we go about buying it?

What we did is we structured it where when we asked the people to bid, we said to them, identify your significant cost centers; do not give us your breakdowns or anything else, but essentially how much of what your bidding is R&D and how much of your R&D are you willing to contribute to this project? You show us a contribution on this.

And this becomes important for the smaller transit systems if they are going to try to implement this. By small, I mean maybe with a hundred buses or less. If they are going to try to implement these sort of technologies, their ability to go and get a grant and then to have a local entity put up the local match. Let's say it is $100,000, just for a nice small number, and they had to come up with 20 percent. Well, 20 percent in a severely constrained economic environment for most city governments is a lot of money.

One of the things we wanted to say to the private sector is why don't you identify that as your contribution. So, essentially, you identify a contribution to the project that becomes the local match so that the Federal Government is not putting up the 100 percent, the local entity is not putting up the 100 percent, is not putting up its 20 percent, but rather we will introduce a new technology.

Mr. BAKER. What you are going to tell me is we are going to have to change UMTA to do that.

Mr. BOLTON. No, not necessarily. I think what we have to do is we have to say that it is okay to go behind certain current regula-

tions. Because this has been done in other parts of the government. It is an education process.

Mr. BAKER. You can submit to the committee a list of revisions that we might do to encourage new technology or innovation.

Mr. BOLTON. I think that IVHS AMERICA is in its institutional committees, that is one of the areas that they are working on, and I think it would probably be better if we had it across the board rather than just from one mode.

Mr. BAKER. Yes. Thank you.

Mr. MACLENNAN. Let me take just a slightly different approach to the same question in a very brief response.

You heard the two administrators this morning, Administrator Linton and Administrator Slater, present what was truly a coordinated approach towards their activities, and at the present time, there are differences in the way you pursue grants, the way you get approvals, what it takes to get a project justified in those two areas of the Department of Transportation, yet much of what we are talking about here, although it be a single project, falls in both areas. And anything that can be done in aligning the two differences, I think, is of value.

I make it only as a comment because I know those two administrators are looking at that right now, and I know that with them at the helm and with the joint project offers that are going, we will see some of this alignment taking place.

But that is some of what we are facing today is a difference in how we get a single project approved. In our case, we have a number of projects that are four-way funded, partially locally by us, partially locally by the highway department, partially FHWA, and partially FTA, and they are all into one project, and the coordination to get all of those approvals together could be simplified.

Mr. BOLTON. If I could just come back to it, let me give you an example, for instance, of something I discovered talking to people in Germany when a standard is being developed there. And, again, part of it is because of our 1930s experience with antitrust and everything else.

One of the things that the Germans do if they identify a problem, let's say the transit systems identify there is a standard that they would like to develop, what they will do is they will get together and they will create an institute. They will fund it with their local money or money from their state or from their federal government or whatever. The institute will then hire a consultant and the consultant then will lead the research on developing that standard. The private sector is asked to contribute either money to help advance that development of that standard, or the technical expertise to help develop that standard.

For us, that is foreign. Not just simply because it is on the other side of the pond, but it is foreign to the way in which we traditionally thought about putting consortia together or other things. I think that may be one of the things that we can learn in terms of how they are using a slight competitive edge to be able to move ahead of us on certain things.

Mr. BORSKI. The gentleman from Michigan, Mr. Ehlers.

Mr. EHLERS. No questions.

Mr. BORSKI. If not, we want to thank you very much for your testimony today. It was most informative and very, very helpful.

Mr. BOLTON. Thank you.

Mr. MACLENNAN. Thank you.

Mr. BORSKI. Our fourth witness today is Mr. Anthony K. Chargin, Deputy Associate Director of Energy at the Lawrence Livermore National Laboratories. Mr. Chargin is accompanied by Mr. Thomas T. Tanemori, founder of the Silkworm Foundation. Mr. Baker.

Mr. BAKER. Mr. Chairman, these are both my constituents, and I want to tell you what a pleasure it is to know Mr. Tanemori. Ten months ago he walked into my district office saying, I'm an engineer, I have some great ideas that I think can help those with visual disabilities. So I linked him up with the Lawrence Livermore Laboratories and Tony Chargin, and from there it is history.

So they are going to be telling you how we can take technologies from the Cold War days and turn them into making a better life for people in America, and part of that is the modernization of our transportation system. So here are two living, breathing examples of real people out in the real world who are going to make their transportation system more efficient.

Thank you, Mr. Chairman, for having this hearing.

Mr. BORSKI. Delighted to have them with us today.

Can I ask you gentlemen to please rise and raise your right hands so I can swear you in before you give your testimony.

[Witnesses sworn.]

TESTIMONY OF ANTHONY K. CHARGIN, DEPUTY ASSOCIATE DIRECTOR FOR ENERGY, MANUFACTURING AND TRANSPORTATION TECHNOLOGIES, LAWRENCE LIVERMORE NATIONAL LABORATORIES, ACCOMPANIED BY THOMAS T. TANEMORI, FOUNDER, THE SILKWORM FOUNDATION AND THOMAS L. MOORE, DEPUTY DIVISION LEADER, COMPUTER AND COMMUNICATION ENGINEERING DIVISION, LAWRENCE LIVERMORE NATIONAL LABORATORY

Mr. BORSKI. Thank you very much. Mr. Chargin, you may proceed.

Mr. CHARGIN. How much time do I have?

Mr. BORSKI. We would prefer if you could limit your oral testimony to five minutes. We will make it a part of the full record your entire testimony.

Mr. CHARGIN. Thank you very much. I am Anthony K. Chargin, Deputy Associate Director for the Energy, Manufacturing and Transportation Technologies Program from the Lawrence Livermore National Laboratory, which is a DOE laboratory, publicly funded.

It is a pleasure to be here again. Thank you for the opportunity. I think this is a very important issue for transportation, and the hearings are producing some very interesting results, at least for me, since I have been here now the second time.

My testimony will have three points here. One is, I will talk about how the environment and energy efficiency need to be a part of IVHS. Second, national laboratories can be a vital effort to helping set the stands for IVHS. The third point is how public transpor-

tation should include consideration for the visually impaired as well as all other citizens.

It was our impression, having participated in IVHS AMERICA and many other activities over the last two years that while environment and energy efficiencies are mentioned as some of the primary goals of IVHS, they are really being under emphasized.

I live in a district with Congressman Baker where a four lane freeway was enlarged to eight, and immediately upon opening, two of those lanes were closed for environmental concerns, and two converted to HOV lanes which were hardly used. So the public investment that was made in fact went for naught, because those concerns weren't considered right from the beginning. I would suggest environment needs to be an issue that should be more widely considered by IVHS people than have been in the past.

I also want to endorse your push for renaming IVHS to Intelligent Transportation Systems, because we are really in the business of moving people and goods and not cars. I would like to point out again I don't think we are going to be able to move people out of cars as long as the car companies are spending $11 billion in R&D, I mentioned these numbers before, while the Federal Transit Administration is only spending $24 million. It is clear which way people are going to go.

So I believe that more effort needs to be put on R&D in these activities. One of the possible things that could be implemented is roadside monitoring of car emissions. With the information infrastructure that will be put in place, this will be actually duck soup.

Ms. Collins was worried about the cost of implementing microchips and things like that in roadways. It turns out there already are telephone lines along the roadways, call boxes along the roadways. If one looks at technology applications and what is going on with the national information infrastructure, those facilities could be used for monitoring emissions and everything else the people before me talked about.

We all know that 10 percent of cars cause all the pollution, and the implication is that the old cars cause the pollution. The latest data assembled by one of our DOE laboratories says it is not necessarily true. Ten percent of cars do produce most of the pollution, but they are also new cars that produce the pollution. It depends on how well the car is made and maintained. Those cars could be found by roadside monitoring systems.

Another point is energy efficiency, which is underlooked. The Congressman from Wisconsin mentioned President Clinton's partnership for new generation vehicles. It turns out that that is not connected to IVHS at all. So here are two major programs, IVHS and PNGV which are not connected. I think that should be fixed.

The second point is that national labs can help in setting the standards. The gentleman before us talked about the German institutes. The government has already paid for an infrastructure of institutes, if you will, in the form of national labs. These laboratories such as ours can participate in helping to set those standards. We have done it already, we have worked it for Caltrans. We worked with that organization to set those things up.

I was interested in listening to Chairman Mineta this morning when he talked about the VHS–Beta shootout mode, are we in that

mode? Of course we are. But VHS–Beta, for example, took the strictly commercial route and technically the wrong one, because of the commercial considerations, VHS was more available than Beta was.

I think the national laboratories could help set the standards which are more far seeing in a technical sense than just commercial interests. If these standards were only turned to commercial outfits, the final selection may not be the best.

Since the time constraints we are working with here are very long, 40 years or more, it is imperative that the best technology be selected. I believe the national labs can accomplish that.

The final point is on public transportation. I think the intermodal effects really need to be emphasized more in ITS than they have been. Everybody is talking about the joint office of IVHS. It turns out it only has two modes in it. There are other modes that could be put in. Mrs. Molinari talked about boats. The Coast Guard is not part of IVHS, neither is FAA, neither is the Federal Railroad Administration. I think those could be considered.

So if those things are done right, just the way the two gentlemen in front of us have talked about, then the Americans with disabilities can take fuller advantage of it than they have been able to in the past. I think Mr. Tanemori who will follow me will talk more about that.

So in closing, I would like to say, let's consider the environment so we don't make investments from which we have to backtrack. Let's use the facilities that the taxpayers have already paid for, and let's emphasize the intermodal aspects of ITS in the most forceful way, not just the way the two administrators talked about before us.

Thank you very much.

Mr. BORSKI. Thank you.

Mr. Tanemori.

Mr. TANEMORI. Mr. Chairman and Members of the committee, I would like to make a couple of remarks here if I may by way of introduction, who I am and why I am here to seek your help.

Congressman Baker already mentioned that I am not an engineer nor do I have an engineer's capability. I think it has been proven to me this morning. I heard so many technical terms, IVHS or TIS, so many. All I know is the initials GI. That is government issue. That is all the terminology that I know.

But second, Congressman Mineta from San Jose, he made a reference about Starbombing, a reference to the war technologies. Perhaps I am the only one today, I can say yes, I have witnessed technology of the war, defense mechanism, as well as personally I experienced that technology.

I am Thomas Tanemori. I am a survivor of the August 6th, 1945, Hiroshima bombing. I lost my family, a total of six members, including my parents. In 1956, fate forced me to seek a new life in America, with hopes and dreams. And I was only 18 years old, but fate continued to follow me.

After an extended illness I was rescued and protected by an American nurse and a Japanese family. Then that is the beginning of my new life. I was able to start a new life with hopes and dreams, and since I came to this country.

I was able to witness the rebirth of post-war America. Yes, I have been privileged to learn to become a real American. For example, I have been able to attain a formal education, which I was denied when I was in Japan because of my social status. I have even learned what it is like to be Japanese in America.

Then, one day, the greatest decision I have ever made, I became a naturalized American citizen on August 16, 1974, with all the rights and privileges and the responsibilities. Because of this, I realize I am responsible, not only to be a citizen, but a productive citizen. And I am grateful for what America has offered to me. I became educated. I taught high school and college, in English, by the way. That was a pretty good accomplishment.

I became a consultant on behalf of the California State Agriculture Department, developing the United States-Japan and Pacific Rim market.

I also spent a great deal of time with volunteerism. This is where my heart is. I want to share my heart, what American people have done for me. I want to touch them as much as I have been touched.

I was pleased for the wonderful opportunity, about six years ago, Mr. Chairman, I began to lose my eyesight. I realized at 1945, the atomic bomb that took my parents, destroyed my family, took the honorable family name, then to face this physical trauma, watch my world getting darker and darker.

For the last six years I stumbled through the streets of our Nation, unable to ride, use the public transportation to get around, totally lost my personal esteem, sense of worth.

How many nights, how many days must I cry, how can I allow these hands of mine to forget to work? How can I allow my hands to forget to touch others as I have been touched?

Yes, it was soul searching. But one day I came to a realization, and I have to reconcile myself to the fact that I am losing my eyesight. I realize going blind is not the end of the world. After all, there are many others, millions and millions of folks who are plagued by their disabilities.

Now, I have many, many wonderful friends who have been my strength. So I realized, this misfortune, perhaps some may interpret it, I said, this is the land of America, let me use it for positive!

But the question is, how can I, as a visually impaired person, return to the mainstream society as a productive citizen? Then I began to gather data, asking myself, how can I freely go from one place to the next throughout the cities, the streets, using the public transportation of our land?

Therefore I gathered the data, exactly just what I need. And I was able to identify these five elements, transportation-related needs for visually impaired. These are navigation, transportation identification, collision avoidance, emergency sound, then traffic management.

If these informations or these elements can be put together somewhere, I could utilize this information in some form or another. Then I am able to maneuver myself throughout the cities of our Nation, utilize public transportation to become independent, with a sense of freedom.

Then, because I am not an engineer and I do not know how to go about, and that is the reason I came to Congressman Baker one

day. It is my understanding, since hearing the testimony this morning, that Congress is investing a tremendous energy and money with a vision, with transportation solutions.

It is also my understanding that the Lawrence Livermore National Laboratory is interested in working with this project that Congress has. I wonder if these technologies can be adapted, can be transferred to bring it down to personal application for us visually impaired along with 3.3 million others who need an informational guidance device whereby we could become productive citizens, where I could return to my former place where I could be a part of that mainstream.

So it is my desire today, as Mr. Tony Chargin or Mr. Tom Moore, engineer, who is the one who really put the idea together, to see the possibility, that these technologies can be transferred to create environmental informational guiding devices in the public's transportation system whereby we as visually impaired may be just as productive as you are.

To this end, I will ask your heartfelt consideration in developing this device. And I thank you for the part you play in making it happen.

Thank you.

Mr. BORSKI. Thank you very much, sir.

Let me recognize the gentleman from California, Mr. Baker.

Mr. BAKER. I would like to recognize Michi, who is also about 10 months old, 10 months with Mr. Tanemori. He is the seeing eye dog with Mr. Tanemori. I am glad she is here today, too.

Mr. TANEMORI. Thank you so much, Congressman Baker.

Mr. BAKER. Thomas Moore, if you could come forward also. Tom, could you spend one minute explaining what we are talking about in this advanced technology for the visually impaired?

Mr. MOORE. There has been an evolution of the ideas that were originally proposed by Mr. Tanemori. The ideas that he had were basically to have the infrastructure, namely the environment which he walks through, report to him information that is important to him, things like his location is probably one of the biggest things, things like dangers that may be in the area, directions and other kinds of things that he may encounter.

When we looked at the aspects of how one would implement such a scheme, it became apparent that the original scheme would put a tremendous burden on an infrastructure to support it, both to install it and maintain it. So we turned it around a little bit, and we took the idea of putting electronic tags into the environment where basically you tag, with inexpensive devices, anything in the environment that you want to provide a message for, for instance a traffic signal, a street sign, a doorway, the statue of Simon Bolivar, a whole variety of things, even moving objects such as buses, public transportation.

The user has a device which interrogates these tags, the tags report a unique identifier. The user has a database, if you will, that has the information relevant to that tag and reports it. And it could be things like, again, like location. It could be information about bus schedules. It could be an identification of a particular transportation vehicle like the number 12 bus line as the bus comes up and approaches a bus stop, the fact that you are in front

of Macy's, some detailed information about the environment can now be reported to the individual.

This type of technology isn't limited to the outdoors. It can be applied internally to buildings such as this one, to help visually impaired people and people with other types of handicaps.

Mr. BAKER. You say this is relatively accessible and relatively inexpensive, to tag items?

Mr. MOORE. That is correct. The technology for tagging has a variety of manufacturers and manifests itself in a variety of forms. The tags themselves are inexpensive. The tag itself does not have to know anything about the use of the tag. That burden is put on the user of the system. So you can have one tag service a variety of applications and a variety of users, including traffic management, as an example.

Mr. BORSKI. Mr. Ehlers.

Mr. EHLERS. Thank you. Just a few questions on this. The tag I assume is a small radio transmitter of a limited range that identifies the objects it has on?

Mr. MOORE. It identifies itself and then you carry information that tells you about the object.

Mr. EHLERS. I see. So each tag then has a unique digital code of some sort and you are carrying a receiver that interprets the digital code and tells you what it is?

Mr. MOORE. That is correct.

Mr. EHLERS. Okay. And let's assume a large scale implementation of something like that in the metropolitan area. Are you saying that would still be less expensive than providing individuals with the GPS system which would give them all the information they wanted but would involve the expense of programming into the system everything that is at a particular coordinate?

Mr. MOORE. The problem with the GPS is it can't identify objects it can't resolve objects in a close location. The other problem with it is you can't go inside with it, you can't go underground in subways with it. And it has a hard time in urban canyons. The fewer satellites it acquires, the poorer resolution.

What this particular thing does is allow the environment to be uniquely identified and have information that is pertinent to specific objects.

Mr. EHLERS. But it is limited in that you are not going to tag everything, whereas with the GPS system if you program in all the information, which you would do for everyone, you would have all the information? It would be just how much you wanted to program into the memory.

Mr. MOORE. That is correct. And the kind of information you wanted to report to an individual. For instance, if you are at the corner of Main Street and Elm, does the GPS-driven system—the GPS system knows you are at the corner and reports that to you, but it may or may not know about bus schedules at that corner, it may not know there is a construction site next to it, it may not know a lot of things about that particular area. That is the advantage of tagging over a GPS-driven system.

Mr. EHLERS. But your digital receiver would have to know all that if it is going to interpret.

Mr. MOORE. The receiver gets information about the tag. The wearer or the user carries a database with them that correlates information pertinent to that tag and reports it to the user.

Mr. EHLERS. I am just saying the user has to carry the information in either case, whether it is GPS or something that detects the tags.

Mr. MOORE. Yes.

Mr. EHLERS. Thank you, Mr. Chairman.

Mr. BORSKI. Mr. Moore, tell us a little about the cost associated with this device.

Mr. MOORE. The information I have from one of the manufacturers of these types of tags estimate that each tag—they are called active tags. You can visualize a thing about the size of a credit card, a quarter inch thick, has a nose on it that is its antenna. Between $20 and $50 for that particular device.

There are other tag technologies that are less expensive, but put more demands on the user, and these kinds of selections and trade-offs as to how much the user would have to have to carry around with them versus how much is in the tag is a trade-off yet to be done.

Mr. BORSKI. Mr. Chargin, let me ask you a question. A previous witness at another day of these hearings testified there is a need for an independent ITS program evaluator, not DOT and not IVHS AMERICA. Do you agree with that recommendation?

Mr. CHARGIN. Yes. But if I can draw on some other examples where we might have participated in that, the nuclear power industry, for example, ran across this problem about what are the standards for safety and things like that.

In those days the Atomic Energy Commission was in charge of everything that had to do with nuclear things, weapons as well as nuclear power production. I believe it was in the early 1970s where that function was separated. Nuclear Regulatory Commission was setup to be in charge of the standards.

And so in that case, in fact, our laboratory started working with the Nuclear Regulatory Commission to be an impartial judge of what those standards should be. So there were the government agencies that were in charge of running the program, there were the commercial interests, of course, who wanted to make the most money possible, and then there was a third party, our laboratory, that would consider a systemwide application and say, okay, what is the right thing to do for the taxpayers.

Mr. BORSKI. The gentleman from California, Mr. Baker, has a question.

Mr. BAKER. Earlier we were mentioning the 2,400 bridges, Tony, that need refurbishing in California because of likely future earthquakes. Do you have the technology to X-ray those—I am using very crude terms—look into those bridge abuttments and tell us which ones are likely to go first and what is the best remedial procedure to improve them, thereby helping us focus our ability or focus our allocation of resources to avert real disasters? You are involved with that with the State of California. Can you give us very briefly where we ought to be going with that?

Mr. CHARGIN. The bridge issue is made more important in California because of the earthquakes, but it is also an issue nationally

speaking because in the rest of the Nation, the bridges are wearing out and in California, they may fall down because of natural disaster. They seem to fall down because of floods, too.

What can be done technically speaking is inspect those bridges in more detail than they are being inspected right now. Right now the inspection technology is basically human eye. There are better tools of inspection available, like you mentioned, X-rays. There are others, such as infrared devices, and ground penetrating radar that can be applied to it. We are currently talking to FHWA about applying those technologies to bridges.

Mr. BAKER. Thank you. I want to thank the Livermore Lab for working with us on these technologies. Mr. Tanemori, I would like to thank you for being here today and presenting how our government affects individuals and how we can make life better for all of our citizens. And Tom Moore from the laboratory, thanks for working with Mr. Tanemori. I am hoping we will be able to see this technology built in as we move forward with these new technologies in our transportation system. But thank you, Tom, and Thomas, and Michi, for being here today.

Mr. BORSKI. Thank you very much, gentlemen. I appreciate it.

TESTIMONY OF GARY CURTIS, DIRECTOR OF OPERATIONS, COMMERCIAL VEHICLE SAFETY ALLIANCE

Mr. BORSKI. Our fifth witness is Mr. Gary Curtis, Director of Operations, Commercial Vehicle Safety Alliance.

[Witnesses sworn.]

Mr. BORSKI. Mr. Curtis, you may proceed. Let me remind you your full statement will be made a part of the record.

Mr. CURTIS. I am Gary Curtis, Director of Operations of the Commercial Vehicle Safety Alliance. I welcome the opportunity to present our views on the Intelligent Highway-Vehicle System's Commercial Vehicle Operations Program.

CVSA is an association of State, provincial, and Federal officials responsible for the administration of enforcement of motor carrier safety laws in the U.S., Canada, and Mexico. Our membership includes over 200 industry members who are committed to the alliance and helping us achieve our goals. We are a not-for-profit organization established to promote uniformity in motor carrier safety inspection and enforcement programs.

The IVHS–CVO program in order to be successful in its ultimate deployment as a national and international program will depend heavily upon the support of the enforcement community represented by the CVSA membership.

It is the roadside inspection person who will make the ultimate decision, based on information available at the inspection site through IVHS technology, on whether or not to stop a vehicle for inspection or to let it pass because it has met certain safety hazards materials criteria, has the proper economic and registration credentials and complies with the size and weight limit laws.

As you may know, the overall goal of the IVHS–CVO program is to concentrate resources on the vehicles that need to be inspected and to electronically clear those trucks that based upon information available at the inspection site to the inspection personnel are in safe operating condition.

Until very recently, most if not all of the IVHS–CVO projects, such as Help-Crescent in the West, and Advantage I–75 in the Midwest and South, have concentrated on Weigh-in-Motion, credentials and tax and registration technologies. While these are important and necessary to the overall IVHS–CVO goals, they do not directly deal with specific safety functions and criteria.

Safety, as you might understand, is of paramount concern to the enforcement community and is the primary issue we at CVSA are focusing on with respect to IVHS–CVO as it moves to deployment as a national program. Thus we have been encouraged by recent actions of the Federal Highway Administration, Office of Motor Carriers, FHWA–OMC, in funding two safety operational tests for commercial vehicle Out-of-Service Defect Repair Verification as a criterion for electronic safety clearance. One of those projects involves the States of Minnesota and Wisconsin and the other the State of Idaho.

There is no guarantee, at least in our view, that these two operational tests will result in real time inspection information being made available to the roadside inspection personnel through IVHS technology. The Office of Motor Carriers is organizing a project called SAFER, the Safety and Fitness Electronics Record System, which will be designed so that roadside inspection sites will have access to on-line carrier safety information by 1996. Congress has already mandated this project, and specifically requires such information to be available at 100 MCSAP sites by the above date.

Roadside information on carrier history is certainly an important part of the equation for a reasoned decision to clear a commercial vehicle, but by itself, without driver and vehicle and trip specific information, it is not adequate.

We view inspection information as close to real time as possible as a basic and primary safety threshold for any type of electronic clearance program.

The next area critical to the success of the IVHS–CVO is the development of an architecture so that as States and regions move along at a different pace in developing IVHS programs, as will be the case in this basically voluntary program, they will not constantly be faced with having to invest time, money, and resources to retrofit or purchase new equipment in order that it be compatible with a national system.

Efforts are under way to develop such an architecture. The Office of Motor Carriers has engaged an outside contractor to address this need which will hopefully complete its task early enough in the development of IVHS–CVO to avoid serious problems.

A national architecture will ensure that any State can be certain that no matter what grade or level of technology it decides to implement with respect to an IVHS–CVO user function, the basic technology will be nationally compatible.

Should for any reason the development of the architecture be delayed, this can necessitate significant expenditures and resources on the part of the States and eventually retrofit or replace any existing IVHS technology that may not be compatible with a national system once it is finally in place. As I have just pointed out, States are moving ahead regardless of whether a national architecture is in place or not. So it becomes that much more important.

We are pleased to learn that the Senate Appropriations Committee has recommended $12 million for the CVO component of the national IVHS program, $2 million more than the amount requested by the administration. As we understand it, this is still only about 6 percent of the amount allocated for the overall national ITS program.

Certainly this does not appear to reflect the proportionate role and importance of the commercial vehicle operations in the overall ITS program. As we have pointed out, we have looked at ITS–CVO primarily in terms of its safety benefits and reduction in commercial motor vehicle accidents, not just a reduction in traffic congestion, worthy though that goal may be.

We believe the fact that the issue of long-term funding has not been addressed yet, could have the effect of slowing down, if not bringing to a halt, the progress made thus far in testing and demonstration projects. States will only go so far with pilot projects unless they know what is coming long term.

Clearly, in order to address the funding issue, a definitive cost/benefit analysis on all aspects of portions of the ITS must be undertaken. The American Trucking Associations and the National Private Truck Council are just beginning to undertake such a study from the perspective of the trucking industry.

CVSA's ITS committee will be undertaking a similar effort with respect to State governments. So we will be doing our part to develop some hard numbers which thus far have been lacking, for the most part.

The ITS–CVO technology and infrastructure issues are only a part of the equation. The program also involves a new way of doing business on the part of the State and Federal Government and the commercial vehicle industry. There must be true reciprocity, if you will, among the various agencies within the State government that regulate the CMV industry as well as among the States.

Ideally we are looking at one-stop credential shopping available to the carrier in its base State with such credentials accepted by the other States in which the carrier does business. We are also looking at safety and hazardous materials inspection, credential, weight checks done at a station in one State also being recognized and accepted by other States.

Some progress has already been made in breaking down these institutional barriers. For example, CVSA has been successful in implementing its North American uniform driver vehicle inspection standard and out-of-service criteria. This resulting reciprocity is reflected by the CVSA decal program for commercial vehicles.

So we know it can be done. But there is a considerable way to go with respect to the entire ITS–CVO program. And we feel that the only way to achieve this is to obtain a commitment to ITS from the top State political leadership, namely the Office of the Governor.

Even if we make progress on all that we have talked about here today, early architecture and both short and long-term funding, unless there is strong leadership and commitment at the top of State government, the ITS–CVO program will never reach the potential we all envision.

We therefore suggest to you, as we did to the Senate Commerce Committee last fall, that each governor appoint an ITS lead or point person, if you will, to make sure that all of the appropriate agencies for all modes of transportation in the State get on board with respect to IVHS–CVO.

Finally, to reiterate a point we made earlier in the statement, the success of the whole ITS–CVO program rests with the roadside enforcement officer. It is that person who will make the decision based on the information available at the roadside through ITS technology whether to stop the commercial vehicle for inspection or let it pass through in a safe and seamless environment, the overall goal of IVHS.

However, the roadside inspection personnel has been trained to do hands-on inspection of the commercial vehicles and to eye ball the driver. Under ITS–CVO, the inspection personnel will be doing the job much differently. Making this change and change acceptance will take considerable outreach, training, and education. And it must be done early on. This is the number one challenge to us at CVSA. There are more than 7,000 roadside inspectors nationwide. Our IVHS committee is addressing the issue. We are also working with OMC to address the issue as an organization.

We will do our best to inform and educate. But we will only be successful to the extent ITS–CVO develops a strong safety component that is accepted by the enforcement community because that is what the enforcement officer has made the strongest commitment to all these years—removing the unsafe CMV and driver from our highways.

Mr. Chairman, we thank you for the opportunity to testify before the subcommittee.

Mr. BORSKI. Thank you, Mr. Curtis.

I know we are going to be called very soon for a vote. It got reported to the subcommittee that ITS commercial vehicle operations receive about 6 percent of overall ITS funding. Do you think this funding level is adequate and are you satisfied with the kinds of projects that funds are being used for?

Mr. CURTIS. We do not think the 6 percent is proportionate when we are talking about the level of involvement of the commercial vehicle operations to the national transportation policy in this country. We also do not feel like that enough attention or enough funding, enough projects, if you will, have been devoted to the safety side of the commercial vehicle operations.

Mr. BORSKI. Are there privacy problems for the motor carrier industry or concerns about competitors using the information if ITS applications required that on route schedules and truck rates?

Mr. CURTIS. I think from our contacts, the obvious answer to that question is yes. To what extent, I don't think we are in a position to say. I think that would be a question that would be more appropriately put to the industry themselves.

Mr. BORSKI. We tried that as well.

Mr. CURTIS. I am sure.

Mr. BORSKI. Let me ask, does the motor carrier industry have input, to your understanding, into the standard-setting process as carried out by IVHS AMERICA, the States, and groups like the I-95 Coalition?

Mr. CURTIS. Yes, sir, I think so. It is common knowledge that the industry participates in the various—in membership in the various task forces, IVHS AMERICA, and they do have some inroads with the Federal Highway Administration. So I would say, yes, they do.

Mr. BORSKI. Are States developing incompatible standards that require additional hardware rather than simplified motor carrier operations?

Mr. CURTIS. I don't think that is the case at this time. But as I pointed out earlier in my testimony, unless the safety issue for commercial vehicle operations is given some more attention, and very soon, I think we run the risk of that actually occurring.

Mr. BORSKI. Okay. I have no further questions. So let me thank you very much for your input. It was very informative and very helpful. Safety is a major concern to this subcommittee. Thank you, sir. This subcommittee is adjourned.

[Whereupon, at 2:35 p.m., the subcommittee was adjourned.]

[Witnesses prepared statements follow:]

PREPARED STATEMENTS SUBMITTED BY WITNESSES

Testimony Before
US House of Representatives
Committee on Public Works and Transportation
Subcommittee on Investigations and Oversight
on
Intelligent Vehicle-Highway Systems (IVHS)
July 21, 1994
by

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"Intelligent Vehicle-Highway Systems R&D Activities at Lawrence Livermore National Laboratory"

Mr. Chairman and members of the Committee, thank you for conducting this review on Intelligent Vehicle-Highway Systems. I am Anthony K. Chargin, Deputy Associate Director for the Energy, Manufacturing and Transportation Technologies Program (EMATT) at the Lawrence Livermore National Laboratory (LLNL). It's an honor for me to be able to testify here before you again as I did on the topic of transportation and environmental infrastructure.

Consistent with the purpose of this oversight hearing "to provide the subcommittee with detailed and comprehensive information on DOT's stewardship over the IVHS program," my testimony today reflects collective input from LLNL's staff working on the IVHS program. In the first part of my testimony I will discuss how the IVHS program needs to address the issues of environmental impact and energy efficiency. In the second part, I will discuss how the national laboratories and their technologies can be used in the IVHS program and how the *DOT-DOE National IVHS Program - Memorandum of Understanding (MOU)* dated August 6, 1993 might become the first step in making this happen. In the third part, I will propose that IVHS put more focus on public transit systems and make these systems more intelligent.

Environmental Quality and Energy Efficiency

Improvements in environmental impact and energy efficiency are among the major goals of the national IVHS Program. Yet, little has been implemented to significantly achieve these objectives, and focused research, development and deployment efforts have been minimal. The Clean Air Act of 1990 mandates certain air quality standards that are not being complied with presently in many cities. Thus, there is a real urgency in obtaining help in improving air quality from the IVHS Program.

Furthermore, many critics argue that IVHS deployment is likely to make air quality worse, disrupt existing neighborhoods, stimulate undesirable land use patterns and increase energy usage. It is claimed that these negative impacts will occur because of increased traffic created by all of the IVHS measures for increasing traffic capacity. These arguments raise the possibility not only that these claims are true, but that without major new breakthrough technologies and active initiatives, significant delays in the IVHS Program will occur. I live near an area where a four-lane freeway was enlarged to eight lanes to increase traffic throughput. Due to environmental concerns, two of these new lanes were closed immediately and two were converted to HOV lanes. In this instance the taxpayer invested significantly in a road for which the environmental impact was not resolved at the time of construction. The same should not happen to IVHS implementation.

IVHS proponents, on the other hand, argue that environmental and energy benefits will result from various IVHS effects such as traffic smoothing and vehicle engines running closer to their design speed rather than starting and stopping. In addition, multi-modal services have been strengthened in the new national IVHS plan with the goal of improving environmental and energy impacts. Nonetheless, effects of these measures are extremely difficult to predict with confidence (due to uncertainties about future technologies, travel demand and traveler usage), and hence the debate continues without an emerging resolution. Several recent conferences have addressed this subject, and their proceedings reflect the diverse and often contradictory views on these subjects.[1]

In addition to the indirect environmental and energy benefits due to IVHS, there are interesting possibilities for achieving benefits by *design*, by incorporating specific advanced technologies into IVHS systems. Examples of such systems are *in-vehicle* and *roadside* vehicle emissions measurement and monitoring systems. Such systems could be integrated with emissions control systems and their maintenance, as well as into the IVHS transportation management system as a

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[1] *National IVHS and Air Quality Workshop*, Diamond Bar, California, March 29-30, 1993, *National Policy Conference on IVHS and the Environment*, Arlington, Virginia, June 6-7, 1994, and *IVHS Review - Intelligent Vehicle-Highway Society of America*, Fall 1993.

whole, thus placing emissions and energy management on a level of importance equal to that of traffic management. Such integration would provide a range of options and tools for states and local agencies to more advantageously and credibly deal with environmental issues as part of their transportation systems. Such tools would also be more consistent with the language of the ISTEA legislation that calls for explicit environmental planning actions.

We also note that *Science*[2] magazine gave a comprehensive review of air quality and environmental issues and concluded that the number one highest-impact development was monitoring source emissions. This supports our advocacy of IVHS-based vehicle and roadside monitoring systems.

Present models are inadequate to predict with any confidence the environmental and energy effects of IVHS technologies designed for increasing mobility. The uncertainties range from our inability to predict the demand resulting from new technology to our lack of understanding of how drivers, vehicles and vehicle sub-systems actually behave in real traffic situations with respect to, primarily, the generation of emissions and, to a more limited extent, the consumption of fuel. Currently there is good research going on in these areas at universities, and more is about to be initiated. However, much will still need to be done before we can begin to properly understand these complex systems issues.

It is also important to consider how such technology and systems could be integrated with existing and future vehicles. LLNL is a member of the Partnership for New Generation of Vehicles (PNGV) Initiative and is already working with several vehicle manufacturers on emissions modeling, sensing and control. The integration of IVHS systems would be a natural extension, for example, of our FHWA-sponsored work on Commercial Vehicle Operations (CVO) which has resulted in proposed designs and standards for vehicle computers (on-board diagnostics) and communications into which emissions and energy-related functions can be naturally incorporated.

To our knowledge, nothing is presently being done to relate IVHS to President Clinton's PNGV Initiative. Two such major initiatives with overlapping goals should be closely coordinated at the national policy level.

Therefore, the environmental impact and energy efficiency areas are currently a major gap in the national IVHS Program and have the potential for being a show stopper. For this reason, and

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[2] Achieving Acceptable Air Quality: Some Reflections on Controlling Vehicle Emissions, *Science*, Vol. 261, July 2, 1993.

because of the major national priorities involved, the DOT, DOE and other relevant agencies should seriously consider strengthening their programs in these areas.

National Laboratories Can Help Solve the IVHS Challenges

In this second part of my testimony, I would like to comment on how a national laboratory like LLNL can contribute to IVHS. There are three points I would like to make: 1) Many national laboratories have environment and energy imbedded within their mission. As a result of this mission they have developed a strong technical base applicable to address IVHS environmental and energy issues; 2) All of the national laboratories have amassed technologies that can be "spun off" to industry — I'll mention four examples; 3) National laboratories have both a strong technical staff and facilities that could be made available to provide an unbiased technical resource to assist the IVHS Program.

The above three points need to be put into the proper context. Currently LLNL is being funded by DOT / FHWA / FAA / NHTSA on a number of transportation-related projects which are technically unrelated. For example, we are developing: computer software to perform vehicle crashworthiness (occupant safety and roadside barrier design); non-destructive evaluation (NDE) techniques for aircraft, bridge structures and pavement; automatic vehicle identification tag technology and extending it to commercial vehicle operations; and software for traffic management. These programs currently total $3M in funding from DOT. In all of these projects, LLNL is bringing to bear technologies and skills that exist at the Laboratory and adapting them to transportation needs. In general, the technologies that are being employed are not available in private industry (for example, the DYNA-3D computer program used for crashworthiness efforts and advanced NDE techniques utilized for structural and pavement analysis).

DOE Laboratories are Ready to Respond

As a consequence of the end of the Cold War, LLNL's mission has changed and we are addressing a host of urgent issues among which are economic competitiveness, energy security and environmental clean up. Transportation plays a major role in these areas, and LLNL is motivated to help solve some of the problems using its broad range of resources and technical core competencies. DOE and DOT have shown an interest in using the national laboratories by signing a Memorandum of Understanding on IVHS dedicated to collaboration between the two Departments.

Technology Transfer Activities at LLNL

I'd like to mention four areas where LLNL, using its uniquely qualified multidisciplinary staff, is equipped to assemble teams to rapidly address IVHS problems: 1) LLNL is working on traffic

management with a number of federal transportation agencies and with the cities of San Jose, San Francisco and Los Angeles to develop technologies that reduce both energy usage and pollution, and that will make roadways safer and more efficient; 2) we have developed and licensed an inexpensive radar system; 3) we have developed a prototype radio-frequency electronic toll collection system; and 4) we are assembling a team to address low emissions, NOx sensors, advanced composite material modeling and combustion analysis for new vehicles.

Core technologies at LLNL especially applicable to IVHS include sensors, communications, systems integration, local/global atmospheric emission modeling software, simulation/modeling, decision and risk analysis, safety analysis, human factors, computer systems and architecture. Below are examples of four specific applications utilizing these core technologies.

- Traffic Management Software

Under sponsorship of the FHWA much effort in ATMS has been devoted to improving the control of traffic on arterial streets. Transyt7F[3] is a software package that metropolitan traffic engineers use to time signals on arteries. However, it is not easy to use and, in its present form, cannot help make the real-time changes that might be desired under conditions of an unexpected traffic incident. LLNL has been developing an expert system, ExTransyt, to provide an interface with Transyt7F to make it easier to use and permit its rapid deployment in real-time applications. LLNL has had substantial success thus far in the project by producing a component piece of software, WinTransyt, that provides a convenient graphical interface and algorithms for detection and correction of errors. The developer has inspected approximately 250 different data sets from cities around the country and has discovered and helped correct numerous errors (about half of the data sets have been found to have errors). Traffic systems in San Jose, San Francisco and Los Angeles have been corrected by using WinTransyt. The State of California is considering adding WinTransyt to the traffic management software that they provide to local governments. WinTransyt is particularly unique in its ability to discover congestion-producing errors that have existed in traffic systems for several years.

- Simple and Inexpensive Radar

LLNL has developed, as part of the DOE laser fusion program, a unique kind of radar system that requires only very small amounts of power and is simple, inexpensive and effective. The transmitting units of this impulse radar are easily manufactured at low cost, on the

[3] Distributed by FHWA.

order of $10/unit and are thus suitable for transportation applications where cost is extremely important. This technology has already been licensed to a small company, Amerigon, for automotive in-vehicle application. We expect that, through this licensing agreement, and with further assistance from LLNL, Amerigon will effectively develop such applications as collision warning systems. Because of their familiarity with the international automotive industry, we also expect that Amerigon will be able to work closely with automotive manufacturers to achieve widespread penetration of these devices into the automotive industry, and hence help move forward an important IVHS user service. This is an *in-vehicle* application of this technology.

This same radar technology could be the basis of a *roadside* application to traffic surveillance. A major current inadequacy of many Advanced Traffic Management Systems (ATMS) and Advanced Traveler Information Systems (ATIS) is that critically needed real-time information about traffic conditions is inadequate. The current standard vehicle detection device, inductive loop detectors buried in the roadway, is expensive to deploy and maintain and installation involves traffic disruption leading to congestion and more emissions. State and local transportation agencies would strongly prefer alternatives. Furthermore, the new ATMS and ATIS are information hungry: they require greatly expanded sources of reliable, accurate and inexpensive traffic information. The LLNL impulse radar system has the promise for providing the basis for such a system. Small units could be mounted on roadside poles, provided with a supply of low power, and signals collected and sent to a local center for processing and interpretation. This is an example of a project with significant potential IVHS payoff where LLNL has the base technology, but requires further research and development work to demonstrate its feasibility. We are presently seeking appropriate industrial and government partners and funding arrangements.

• Automatic Vehicle Identification

For the California Department of Transportation (Caltrans), LLNL developed prototype radio-frequency Automatic Vehicle Identification (AVI) equipment for electronic toll collection. This rapid-prototype effort was undertaken to demonstrate proof-of-concept of AVI equipment meeting a state-of-the-art state compatibility standard LLNL had helped develop. Our equipment was successfully demonstrated to Caltrans and toll agency officials on Interstate S80 within five months of project initiation. Later, LLNL transferred this technology to industry through extensive documentation and technical discussions with potential vendors. As a result, four companies were assisted in their efforts to manufacture

equipment compatible with the California standard. AVI systems are the building blocks of some of the earliest IVHS systems, so the establishment of standards here is of critical importance.

- Partnership for New Generation of Vehicles (PNGV)

It is expected that the national laboratories, collectively, will make a major contribution to the PNGV Initiative. For example, LLNL is currently pursuing numerous projects in close collaboration with other laboratories and the Big 3 automotive manufacturers. Current technology focus is on low emissions, NOx sensors, and engine system management, advance composite material modeling and computational fluid dynamics (combustion analysis, drag reduction and under-the-hood thermal management). Expected future strong involvement will include energy storage (flywheel) and hybrid vehicle development and prototype demonstration. Clearly, this PNGV initiative should be actively collaborating with the IVHS program to collectively achieve environmental and energy goals.

Standards and Committee Activities at LLNL

A critical requirement for the successful implementation of IVHS applications is the development of appropriate standards for many of the systems and subsystems that must be able to communicate with each other. It is national IVHS policy that these systems be part of a national systems architecture that is open and flexible, and at the same time spells out the standards required to create modularized components that can be produced and marketed at reasonable prices by competitive industries. The ongoing National Systems Architecture Program is addressing many of these issues from a top-down approach. This is a valuable activity and one that is unique among nations in the IVHS world. It is an American initiative of which we can be proud. At the same time, much work at the more detailed level of standards must be done, both in parallel with (because of time pressures) and as a follow-on to the Systems Architecture Program. LLNL can offer a number of examples of what is necessary in the area of standards, and how an organization like ours can contribute. LLNL is well suited to assist in the development of national technical standards. We have a wide range of technical expertise and a perspective that is free from company vested interests or government political pressures.

LLNL has been active in supporting federal and state agencies in the development of standards for vehicle-to-roadway communications using AVI type equipment. We have supported FHWA, IVHS America and Caltrans for commercial vehicle electronic clearance (an early implementation of IVHS applications, and one where national compatibility is particularly critical), future electronic toll and traffic management national interoperability, and the previously mentioned

California compatibility standard. In these efforts LLNL staff serve as members of various national and international standards-setting committees including the IVHS America Electronic Toll and Traffic Management (ETTM) Steering Committee, the International Standards Organization (TC 204) and the American Society of Testing and Materials (ASTM).

LLNL's successful work in support of various standards illustrates the importance of several basic ingredients:

- Technical expertise in basic science and technology
- Expertise in technology design and evaluation and in systems engineering
- The ability to partner with the appropriate public and private agencies
- Organizational objectivity and credibility

In addition to the standards-setting committees, LLNL plays a prominent role on a number of other transportation-related national boards. These include the IVHS America - Benefits, Evaluations, and Costs Committee, the Transportation Research Board's committee on Applications of Emerging Technologies and the National Highway Traffic Safety Association's (NHTSA) Crashworthiness Subcommittee.

Intermodal Transit Systems

There is a need for increased focus on the intermodal aspects of IVHS. Such a focus would stimulate public transit to play a larger role in improving air quality and energy efficiency. Therefore, I support the suggested change in the name of the IVHS Program to the Intelligent Transportation Systems (ITS) Program because it more realistically represents the increased intermodal aspects of the evolving IVHS Program. In addition, by broadening the program name, it explicitly encourages an intermodal (transit) focus within the IVHS Program.

At the request of Congressman Baker, who was inspired by the ideas of Mr. Thomas Tanemori and the passage of the 1990 *Americans with Disabilities Act (ADA)*, LLNL is investigating various techniques and technologies that could be applied to assist the visually impaired. The ADA Act establishes *mobility* as a significant right for a broad set of our population and touches virtually every federally sponsored and supported program[4]. Putting intelligence into the public transit systems presents an opportunity to assist the disabled and visually impaired.

[4] Will IVHS Transform Transportation System Effectiveness, *Proceedings - IVHS America, Benefits, Evaluation and Costs Committee*, San Diego, CA, Dec. 1-3, 1992.

In the course of this effort, we have discovered a proposed effort by the Veteran's Administration in Palo Alto on a very similar subject. Dr. Greg Goodrich at the VA's Western Blind Rehabilitation Center, Palo Alto, warmly received our solution and has expressed a desire to work collaboratively on developing and implementing these technologies. This is an example of where IVHS technologies, properly configured and implemented could provide synergistic uses across many sectors of our society.

Conclusion

I have three key points to conclude in this testimony.

First, that environmental and energy impact issues need increased focus and funding within the IVHS Program to prevent possible backtracking after implementation due to environmental concerns.

Second, that the national laboratories have technical staff, facilities and core technologies that are applicable to addressing IVHS critical issues.

Third, that by broadening the scope of IVHS to include intermodal (transit) systems there will be an incentive to incorporate intelligence into these transit systems which will assist many segments of the population including the disabled and visually impaired.

COMMERCIAL VEHICLE SAFETY ALLIANCE

An Association of State, Provincial and Federal Officials
Responsible for the Administration and Enforcement of Motor
Carrier Safety Laws in the United States, Canada and Mexico.

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STATEMENT BEFORE THE HOUSE INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE U.S. HOUSE OF REPRESENTATIVES

IVHS HEARING
JULY 21, 1994

Commercial Vehicle Safety Alliance
5430 Grosvenor Lane
Suite 130
Bethesda, MD 20814

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Gary E. Curtis
Director of Operations

Mr. Chairman, Members of the Subcommittee, I am Gary Curtis, Director of Operations of the Commercial Vehicle Safety Alliance (CVSA) and I welcome the opportunity to present our views on the Intelligent Vehicle Highway Systems Commercial Vehicle Operations program that is now beginning to take shape.

CVSA is an association of state, provincial, and federal officials responsible for the administration and enforcement of motor carrier safety laws in the U.S., Canada, and Mexico and includes over 200 industry members who are committed to helping the Alliance achieve its goals. We are a not-for-profit organization, established to promote uniformity in motor carrier safety inspection and enforcement programs.

The IVHS-CVO program, in order to be successful in its ultimate deployment as a national and international program, will depend heavily upon the support of the enforcement community represented by the CVSA membership. After all, it is the roadside inspection officer who will make the decision, based upon the information available to him at the inspection station through IVHS technology, on whether or not to stop the truck and inspect it or to let it pass by because it has met certain safety and hazardous materials criteria, has the proper economic and registration credentials, and complies with the size and weight limit laws.

2.

SAFETY

As you may know, the overall goal of the IVHS-CVO program is to concentrate inspection resources on the Commercial Motor Vehicles (CMVs) that need to be inspected and to "electronically clear" those trucks that, based upon information available to the inspection officer, are in safe operating condition.

Until very recently, most, if not all, of the IVHS-CVO activity and demonstration projects, such as Help-Crescent in the West, and Advantage I75 in the Midwest and South, have concentrated on Weigh-in-Motion (WIM), and AVI (credentials--tax and registration) technologies. While these are of course important and necessary to the overall IVHS-CVO goals, they do not directly deal with specific safety functions and criteria.

Safety, as you might understand, is of paramount concern to the enforcement community and is the primary issue we at CVSA are focusing on with respect to IVHS-CVO as it moves to deployment as a national program.

Thus, we have been encouraged by recent actions of the Federal Highway Administration, Office of Motor Carriers (FHWA-OMC) in funding two safety operational tests for commercial vehicle Out-of-Service Defect Repair Verification as a criteria for electronic safety clearance. One involves the states of Minnesota and Wisconsin, and one involves the state of Idaho.

There is no guarantee, at least in our view, that these two operational tests will result in real time inspection information being made available to the roadside

inspection officer through IVHS technology as a part of the overall national program.

The Office of Motor Carriers is organizing a project called SAFER, the Safety and Fitness Electronic Records System, (formerly referred to as CSFS, Carrier Safety Fitness System) which will be designed so that roadside inspection sites will have access to on-line carrier safety information by 1996. Congress has already mandated this project and specifically requires such information to be available at 100 MCSAP sites by the above date.

Roadside information on carrier history is certainly an important part of the equation for a reasoned decision to clear a CMV. But by itself, without driver and vehicle specific information, it is not adequate.

We view inspection information as close to real time as possible as a basic and primary safety threshold for any type of electronic clearance program.

ARCHITECTURE

The next area critical to the success of IVHS-CVO is the development of an architecture so that as states and regions move along at a different pace in developing IVHS programs, as will be the case in this basically voluntary program,they will not constantly be faced with having to invest time, money, and resources to retrofit or purchase new equipment in order that it be compatible with a national system. This potential problem can apply to software and hardware for computer systems, to transponders, electronic license plates,

roadside readers, and weigh-in-motion technologies, to list but just some of the many different technologies applicable to IVHS-CVO.

Efforts are underway to develop such architecture. The Office of Motor Carriers has engaged an outside contractor to address this need which will hopefully complete its task early enough in the development of IVHS-CVO to avoid serious problems.

Let me give you an example which shows the potential for problems without such architecture. The Eastern States Consortium, a group of states in the Middle Atlantic and Northeast area of the country, has been meeting in recent months to develop an IVHS-CVO plan for the region to dovetail with the I95 IVHS Corridor plan. A key element in any IVHS-CVO plan is the transponder, or the electronic license plate. Very few CMVs in this region now have transponders. But this may change rapidly due to the implementation of automatic toll collection in the Northeast region by the New York-NewJersey Port Authority. It has decided to use a particular transponder for its program. CVO's in that area will want to use this particular transponder, of course, to avail themselves of the toll pass-through opportunity. This transponder is in the public domain and it is low cost. So the Eastern States Consortium which includes the states as far south as Virginia and West Virginia is giving serious consideration to the adoption of this transponder for its overall CVO plan covering safety, size and weight, and economic credentials.

This is only one region of the country. I cannot speak at this time as to what may be going on in other major corridors. We can only hope that without a

national architecture yet in place, they will consider taking the same action that the Easter States CVO Consortium is. If not, I'm sure you can see the implications of different transponders in different parts of the country. This would be of concern to both the CMV industry and the state enforcement agencies as well.

A national architecture will ensure that any state can be certain that no matter what grade or level of technology it decides to implement with respect to an IVHS-CVO user function, the basic technology will be nationally compatible.

Yet another similar example can be offered. As you know the ISTEA legislation mandates that all states must join IFTA (International Fuel Tax Agreement) by 1996. New York State has developed a consortium to help implement this goal by setting up a clearinghouse for the banking functions between states relative to this process. The following states have already joined this consortium from different regions of the country: Texas, California, Georgia, Pennsylvania, Delaware, Massachusetts, Connecticut, New York.

The Eastern States IVHS-CVO Consortium, referred to earlier, will now also be considering whether to join this New York IFTA Consortium, thus bringing more states into the picture. This could be the jumpstart for a national program of one-stop credential shopping for the CMV industry. But as yet this New York project is not part of any national architecture. It's possible that all states might just decide to adopt it. But then again that may not happen. And without a national architecture, I think you can see what the implications might be.

Should for any reason the development of the architecture be delayed, this could necessitate significant expenditures and resources on the part of states to

eventually retrofit or replace any existing IVHS technology that may not be compatible with a national system once it is finally in place. As I have just point out, states are moving ahead regardless of whether a national architecture is in place or not.

FUNDING

Development and Testing

We are pleased to learn that the Senate Appropriations Committee has recommended $12,000,000 for the CVO component of the National IVHS Program, $2,000,000 more than the amount requested by the Administration. As we understand it, this is still only about 6% of the amount allocated for the overall National IVHS Program. Certainly this does not appear to reflect the proportionate role and importance of CVO in the overall IVHS program. As we have pointed out, we look at IVHS-CVO primarily in terms of its safety benefits and reduction to CMV accidents, not just a reduction in traffic congestion, worthy though that goal may be.

Deployment and Maintenance

Thus far, the IVHS-CVO program has been a voluntary program for both the CMV industry and state government. This is a fundamental concept that we strongly endorse. However, the question that continually arises in all meetings and forums we have participated in with state enforcement officials, as well as with industry, is . who is going to pay for the deployment of this program on a national basis as well as who is going to pay for the ongoing maintenance of the IVHS-

CVO technology infrastructure? While all of the users and stakeholders in IVHS-CVO recognize they must make a substantial investment of money and resources, they clearly signal that they are not willing or able to foot the entire bill. There will clearly have to be some measure of federal assistance that is available on a consistent and long-term basis much as it has been for the federal-aid highway program since 1956. Obviously, the apportionment method would have to be on a matching and an incentive basis.

We believe that the fact that this issue of long term funding has not been addressed yet could have the effect of slowing down, if not bringing to a halt, the progress made thus far in the testing and demonstration projects. States will only go so far with pilot projects unless they know what is coming long term.

Clearly, in order to address the funding issue, a definitive cost/benefit analysis on all aspect of IVHS-CVO must be undertaken.

The American Trucking Associations and the National Private Truck Council are just beginning to undertake such a study from the perspective of the trucking industry.

CVSA's IVHS Committee will be undertaking a similar effort with respect to state government. So we will be doing our part to develop some hard numbers which thus far have been lacking for the most part.

Neverthelsss, there is no doubt that IVHS deployment will involve a significant cost. Weight-in-motion equipment alone could cost a state $50,000 per installation.

8.

STATE IVHS LEADERSHIP

IVHS-CVO technology and infrastructure issues are only a part of the equation. The IVHS-CVO program also involves a new way of doing business on the part of state and federal government and the CMV industry.

There must be true reciprocity, if you will, among the various agencies within state government that regulate the CMV industry as well as among the states. Ideally, we are looking at one stop credential shopping available to the carrier in its base state with such credentials accepted by the other states in which the carrier does business. We are looking at safety and hazardous materials inspections, credentials, and weight checks done at a station in one state as being recognized and accepted by other states.

Some progress has already been made in breaking down these institutional barriers and achieving the desired reciprocity. For example, CVSA has been successfull in implementing its North American Uniform Driver-Vehicle Inspection Standard and Out-of-Service Criteria. This resulting reciprocity is reflected by the CVSA decal program.

So we know it can be done; but there is a considerable way to go with respect to the entire IVHS-CVO program. And we feel the only way to achieve this is to obtain a commitment to IVHS-CVO from the top state political leadership, namely the office of the Governor.

Even if we make progress on all that we have talked about earlier---safety, architecture, and both short and long term funding, unless there is strong

leadership and commitment at the very top of state government, the IVHS-CVO program will never reach the potential we all envision.

We therefore suggest to you as we did to the Senate Commerce Committee last fall, that each Governor appoint an IVHS lead or point person, if you will, to make sure that all of the appropriate agencies in the state get on board with respect to IVHS-CVO.

EDUCATION/OUTREACH

Finally, to reiterate a point we made early on in our statement: the success of the whole IVHS-CVO program rests with the roadside enforcement officer. It is that person who will make the decision based on the information available at the roadside through IVHS technology whether to stop the CMV for an inspection or let it pass through in a "safe and seamless" environment, the overall goal of IVHS.

However, the inspection officer has been trained to do hands-on inspection of the CMV and to "eyeball" the driver. Under IVHS-CVO, the inspection officer will be doing his job differently. This will take considerable outreach, training, and education. And it must be done early on. This is the number one challenge to us at CVSA. There are more than 7,000 roadside inspectors nationwide. Our IVHS-Committee is addressing this issue. We are also working with the OMC to address this.

We will do our best to inform and educate. But we will only be successful to the extent that IVHS-CVO develops a strong safety component because that is what the enforcement officer has made the strongest commitment to all these years---removing the unsafe CMV and driver from our highways.

Mr. Chairman, we thank you for the opportunity to testify before this Committee.

Overview of *Advantage I-75* Mainline Automated Clearance System

prepared for

Investigations and Oversight Subcommittee
of
Public Works and Transportation Committee,
United States House of Representatives

July 21, 1994

presented by

Don C. Kelly, P.E.
Secretary of Transportation
Commonwealth of Kentucky

Chairman
Policy Committee
Advantage I-75

Chairman
Advanced Transportation Systems Operations Subcommittee
American Association of State Highway & Transportation Officials

INTRODUCTION

Mr. Chairman, members of the Subcommittee, my name is Don Kelly and I currently serve as Secretary of the Kentucky Transportation Cabinet; Chairman of the Policy Committee for ADVANTAGE I-75; and Chairman of the Advanced Transportation Systems Operations Subcommittee of AASHTO. It is a pleasure to be able to share with you some real life successes and ongoing opportunities of our ADVANTAGE I-75 project.

While it is exciting to talk about the future roles of technology in helping to meet America's transportation needs, I sit in a unique position. I must answer daily to a Governor, a legislature, the media, and 3.6 million people (most of whom do not have much patience with government), who all demand to know how I am spending the money today to make their jobs more secure, their travel safer, and their transportation system more efficient. I simply can not wait five or ten years to provide answers.

The whole concept of ADVANTAGE I-75 was predicated on the goal of using existing and evolving technology in a program of projects which could be implemented quickly in the real world. I intend to demonstrate to you today the reality of this concept and how we are working together in a partnership of public and private agencies in the Interstate 75 corridor to achieve a state of the art commercial vehicle program. This is being accomplished through government and private entities sharing in the implementation responsibilities, and each committed to making the project a success.

This project is a partnership of the states of Florida, Georgia, Tennessee, Kentucky, Ohio, Michigan, the province of Ontario, and the Federal Highway Administration. We see this project as laying the groundwork for an expansion to other portions of the Interstate system.

INTRODUCTION TO *ADVANTAGE I-75*

What is *Advantage I-75*?

Advantage I-75 is a partnership of public and private interests along the Interstate 75 corridor. The goal of the partnership is to reduce congestion, increase efficiency, and enhance safety of motorists and other users of I-75 (and its connections into Canada) using advanced vehicle and highway technologies. The partnership had its beginnings in June of 1990 when a concept conference was held in Lexington, Kentucky to explore the feasibility of using advanced technology to expedite the movement of commercial vehicles on I-75.

The Key Principles of *Advantage I-75*

In the original concept paper for ***Advantage I-75***, several key principles were presented which have guided development of the motor carrier project. These are:

- The project shall be initially small in scale, but incrementally expansible.
- Emphasis shall be on implementation.
- The project will utilize proven, off-the-shelf technology.
- Decentralized control will be established and maintained through a state/provincial partnership.
- Maximum reliance will be placed on existing agencies/institutions and existing statutes/regulations. Little or no institutional or statutory change is required to implement and operate the project.
- Close cooperation will be established and maintained between the public and private sectors.
- Expansions into interconnected corridors and other geographical regions can easily be accommodated.

What is the Mainline Automated Clearance System?

The motor carrier project currently being conducted by the ***Advantage I-75*** partnership is called the Mainline Automated Clearance System, or MACS. The objective of MACS is as follows:

"To allow transponder-equipped and properly documented trucks to travel any segment along the entire length of I-75 (and Highway 401 in Canada) with no more than a single stop at an inspection station."

This goal of reducing or eliminating weigh station stops has been the objective of MACS from its inception, and it remains the objective today.

Why Minimize Weigh Station Stops?

Inspection stations, or weigh stations, are an important element in motor carrier administration and enforcement. These stations provide the opportunity for state enforcement personnel to check the vehicle's weight, dimensions, and credentials, and to ensure that the vehicle is safe to operate. In addition, the driver's condition and operating records can be checked. Unfortunately, this process requires trucks to decelerate, exit from the mainline, wait in line, stop for weighing, park for inspection (if selected), and bring required paperwork into the weigh station building for verification (if requested). This process can take anywhere from a few minutes to nearly an hour, depending on the weigh station configuration, the volume of trucks being processed, and whether or not the truck is inspected. Many weigh stations are unable to accommodate the high truck volumes passing through the stations, resulting in frequent backups, long delays, and uncontrolled bypassing when ramps are full.

Weigh station stops are costly for truckers, and, therefore, for the consumer who uses the product transported by truck. Time spent waiting in line, being weighed or inspected, or reviewing paperwork is non-productive time, resulting in a loss of efficiency and productivity. Deceleration, idling time, and acceleration result in higher fuel consumption and additional air pollution. The merging and diverging required at weigh station ramps creates a safety concern, particularly when long lines of trucks back up onto the mainline.

A study by the Center for Urban Transportation Research (CUTR) at the University of South Florida attempted to assign a dollar value to weigh station stops on the Interstate 75 corridor. That study concluded that if all weigh station stops on I-75 could be eliminated (i.e., replaced with mainline bypasses), the savings would total $260 million annually.

OVERVIEW OF MACS

How Does MACS Work?

MACS is based on the use of Automatic Vehicle Identification (AVI) technology to electronically identify and process a truck while it is on the mainline. The AVI subsystem consists of truck-mounted transponders and

roadside readers. Each participating truck has a transponder installed in the cab which is capable of two-way communication with the roadside readers. Each weigh station has a reader installed about 1/2 mile in advance of the station, and an additional 2-3 readers in the weigh station complex (depending on the weigh station configuration).

The basic concept can be described as follows: when a truck begins a trip on the I-75 corridor and is processed through a weigh station, specific information about the truck and the transaction (e.g., date, time, location, weight data, axle data) will be collected and stored electronically in the truck's transponder. As the truck continues its trip and approaches a subsequent weigh station, the information in the transponder can be read by the roadside reader in advance of the station. The reader's computer processes the information, makes a clearance decision, and communicates this decision to the transponder. The transponder has built-in driver communication functions (lights and audible tones) that signal the driver either to bypass or to pull in.

One enhancement to the basic concept which is already being implemented is the use of high-speed weigh-in-motion (WIM) equipment on the I-75 mainline. Installation of WIM equipment at selected locations allows even the first weigh station stop to be eliminated if the first weigh station encountered has mainline WIM equipment.

What is the Scope of MACS?

The Mainline Automated Clearance System will include every weigh station on the I-75/Highway 401 corridor from Miami, Florida to Belleville, Ontario, as illustrated in the attached corridor map. This is a total of 30 weigh stations, 22 in the U.S. and 8 in Ontario. A total of 4,500 trucks will be equipped with transponders for participation in the operational test project. It is envisioned that additional trucks will be allowed to purchase transponders and enroll in the project throughout the duration of the operational test.

What has been Accomplished so far?

Some of the significant milestones in the project since the 1990 Concept Conference include:

- A Policy Committee was formed and tasked with providing direction for the project.
- Kentucky was selected as the Lead State, and the Kentucky Transportation Center (at the University of Kentucky) was designated to provide project staff.

- The Governors of all six I-75 states endorsed the ***Advantage I-75*** program.

- JHK & Associates completed the System Design.

- Science Applications International Corporation (SAIC) was selected as the System Manager.

- Hughes Aircraft was selected to provide the Automatic Vehicle Identification (AVI) technology.

- Functional Requirements were drafted by SAIC.

- Iowa State University's Transportation Center was selected to provide independent project evaluation.

- SAIC recommended using 2-3 sites as an "alpha test" before installing equipment at all corridor sites.

- Federal Highway Administration approved partial funding to incorporate mainline weigh-in-motion (WIM) technology into the project at selected locations.

Currently, two northbound weigh stations (both in Kentucky) have been equipped with the MACS hardware and software and are being operated as an "alpha test." The purpose of the alpha test is to test the system and identify any problems before proceeding with installation at the remaining 28 sites. Approximately 220 trucks have been equipped with transponders for this test period and are receiving bypass or pull-in indications, as appropriate, at the weigh stations.

What is the Project Schedule?

The alpha test is scheduled to end on July 31 of this year, and installation of equipment at additional weigh stations will begin in September. Current plans are to have the system installed at all 30 weigh stations by March 1995. The Operational Test would begin at that point and would run for two years, ending in March 1997.

COSTS AND BENEFITS

How Much Does MACS Cost?

The total, cumulative, public-sector cost of the ***Advantage I-75*** operational test project will be approximately $12 million. The Federal government is providing 80 percent of this funding, with the balance being provided by the ***Advantage I-75*** States and Province.

What are the Anticipated Benefits?

The primary benefit of MACS will be increased productivity for trucking. A reduction in the amount of time spent waiting for processing at weigh stations will translate directly into cost savings, increased productivity, and more reliable on-time delivery of goods. Increased trucking productivity will, in turn, result in lower transportation costs and lower costs of goods for the consumer. In addition, reducing the number of times a truck must decelerate and accelerate, as well as reducing idling time, will result in improved fuel economy and reduced exhaust emissions.

It is generally accepted that the cost of operating a five-axle tractor trailer is $50-$60 per hour[1]. Observations by United Parcel Service on the I-75 corridor have indicated that the delay due to passing through a weigh station (for weight only) varies from 2 to 7 minutes. Another recent study[2] estimated that five minutes could be saved for each weigh station that could be bypassed. Using an operating cost of $60 per hour ($1 per minute) and a 5-minute time savings per bypass results in a $5 savings for each weigh station bypassed.

As stated previously, there will be 4,500 trucks participating in the ***Advantage I-75*** operational test. According to the System Design Report prepared by JHK & Associates, the average truck trip on I-75 involves 2.4 weigh stations. Assuming that each participating truck makes one trip on I-75 per day, five days a week, and that 1.4 weigh station stops will be eliminated per trip, the total savings due to MACS will be $31,500 per day. This equates to $157,500 per week or $8,190,000 per year. For the two-year operational test period, the total savings will be over $16 million, yielding a direct benefit/cost ratio of more than 1.3.

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[1]The ATA Foundation; "A Framework to Measure the Benefits and Costs of IVHS/CVO User Services--Technical Memorandum 1;" Rumford, RI; June 1994.

[2]Oregon Departments of Transportation and Public Utilities; "Strategic Plan for IVHS/CVO in Oregon;" 1993.

The enforcement community also will benefit from ***Advantage I-75***. By allowing those carriers with the best safety and compliance records to bypass weigh stations on the mainline, we will allow enforcement personnel to concentrate their efforts on the more problematic carriers. By eliminating repeated checking of the same vehicle, we will improve enforcement efficiency, allowing more effective allocation of scarce resources.

The data collected by MACS also has significant value. Every transaction between a roadside reader and a transponder is logged and stored in the weigh station computer, and periodically uploaded to the central, "gateway" computer. Information of this type will be of great value to trucking companies, shippers, or customers who wish to track their shipments. Enforcement agencies would also have access to valuable data on motor carrier operations within their respective jurisdictions. This could aid in more effective and equitable revenue collection.

Of course, the benefits described here represent only the tip of the iceberg compared to the potential benefits if the ***Advantage I-75*** concept is expanded and enhanced. Therefore, it is reasonable to discuss some of the ways in which ***Advantage I-75*** can grow.

POTENTIAL GROWTH

Number of Trucks

One of the simplest ways in which ***Advantage I-75*** can grow is in the number of participating trucks. The initial enrollment of 4,500 trucks represents only a small percentage of the total number of trucks that travel on the I-75 corridor. As the project progresses, it is reasonable to expect that additional trucking companies will express interest in participating. The cost of a transponder ($75) can be recovered very quickly when weigh station stops are being eliminated. However, acceptance into the project will depend on certain criteria being met, including an acceptable safety rating and safety record. This will provide incentive for carriers that don't meet the criteria to voluntarily improve their safety performance in order to gain the bypass privilege.

Geographic Expansion

Another way for the project to grow is geographically. While ***Advantage I-75*** is a corridor project, there are many Interstate highways intersecting I-75 to which the system could spread. The Mainline Automated Clearance System is designed to support a network of highways, rather than just a corridor. In this way, MACS can develop into a nationwide system of commercial vehicle electronic clearance.

Enhancements

There are also many potential enhancements to the system which have been recognized. Two of these have been discussed previously: (1) incorporation of mainline weigh-in-motion (WIM) equipment into the system and (2) providing vehicle location and tracking data to trucking companies, shippers, and customers. Others include:

- Providing traveler information and safety advisories to transponder-equipped vehicles. The ***Advantage I-75*** transponder has an interface which can be connected to other onboard devices, such as an onboard computer or display device. When so connected, the transponder can receive messages from the roadside and cause them to be displayed for the driver.

- Multi-state permitting. The partnerships, databases, and communications infrastructure established for ***Advantage I-75*** can be used to support automated issuing and monitoring of permits for travel anywhere on the ***Advantage I-75*** corridor.

- Incident detection using ***Advantage I-75*** vehicles as probes. The ability to detect transponder-equipped vehicles as they pass selected points makes them ideal to serve as probes to determine travel times and detect incidents or congestion.

- On-board safety monitoring. As devices are developed which can continuously monitor various safety parameters of the vehicle and the driver, the ***Advantage I-75*** transponder can be used to communicate this information to the roadside for use by enforcement agencies.

- Tax data collection. Collection of data on miles travelled for use in fuel tax allocation (or weight-distance tax collection) could be greatly improved and automated, thus improving data accuracy and greatly reducing the administrative burdens for collecting, reporting, and analyzing this information.

- HAZMAT Tracking. The movement of hazardous materials could be tracked by equipping HAZMAT trucks with ***Advantage I-75*** transponders.

CONTRIBUTION TO NATIONAL IVHS PROGRAM

While ***Advantage I-75*** is geared toward rapid deployment and early success, it is also directly in line with the stated priorities of the Federal Highway

Administration's IVHS/CVO (Commercial Vehicle Operations) Task Force. The priorities are:

1. Meet Secretary Pena's commitment for the demonstration of a national information system that electronically clears trucks and buses by 1997;

2. Accelerate the automated roadside plan and meet Congress' requirement for automating 100 roadside motor carrier safety inspection sites by 1996;

3. Accelerate efforts that use IVHS technologies for hazardous material incident notification as directed by Secretary Pena and FHWA Administrator Slater;

4. Expand the electronic clearance concept to the Canadian and Mexican borders to support implementation of the North American Free Trade Agreement (NAFTA); and

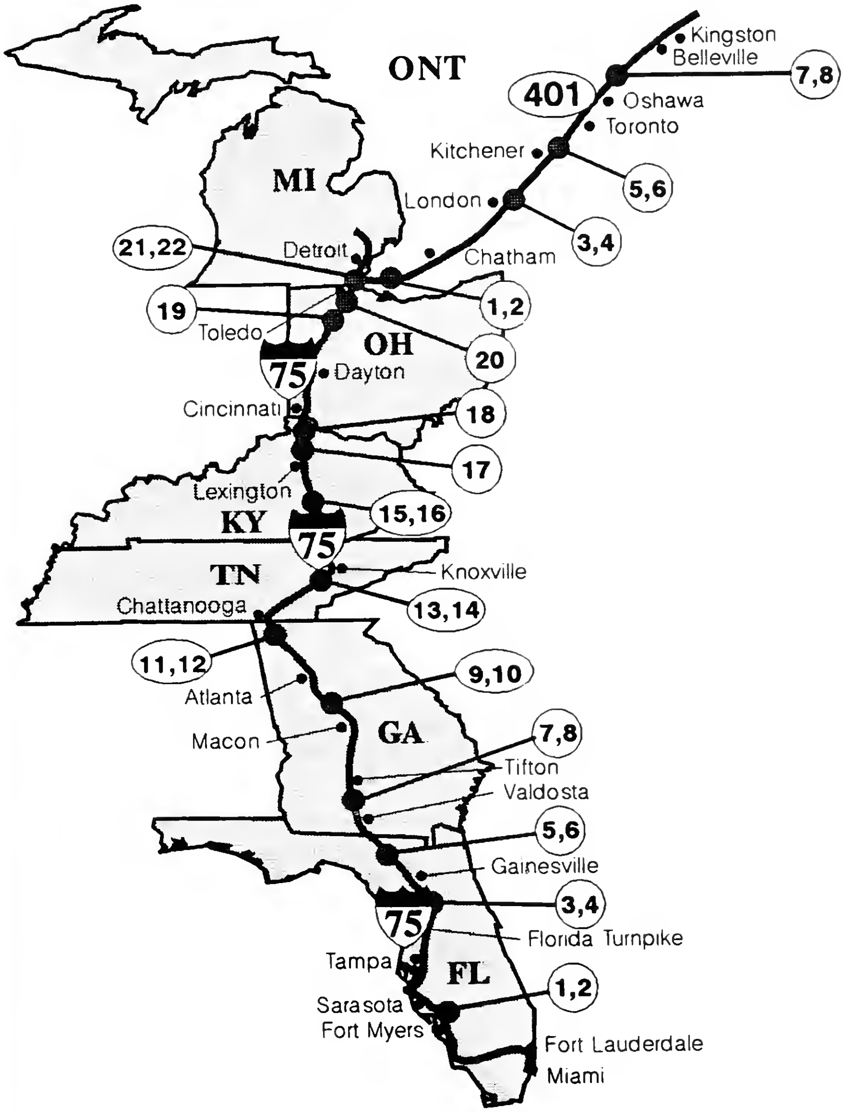
5. Accelerate development of on-board monitoring systems.

Advantage I-75 and its future enhancements contribute directly to accomplishment of these priorities. The partnerships, databases, communications networks, and other infrastructure created to support ***Advantage I-75*** can be used to support numerous applications. In addition, the fleet of trucks participating in ***Advantage I-75*** will be equipped with the leading edge in transponder technology, providing a unique opportunity for supporting advanced vehicle-based applications.

SUMMARY

The ***Advantage I-75*** venture has, from its beginnings, been directed toward providing an early success story in Intelligent Vehicle-Highway Systems (IVHS). The motor carrier project has intentionally been focused on a specific, achievable objective, with a system design that will allow incremental expansion. ***Advantage I-75*** is intended to provide an example of how IVHS technologies can be applied <u>now</u>, at moderate cost, to achieve tangible benefits, while also allowing for expansion and enhancements as new technologies and applications are developed.

ADVANTAGE I-75
CORRIDOR



BYLAWS OF THE

TRANSPORTATION POLICY COMMITTEE

KENTUCKIANA REGIONAL PLANNING AND DEVELOPMENT AGENCY

ARTICLE I

Purpose and Authority

The Kentuckiana Regional Planning and Development Agency, KIPDA, is the metropolitan planning organization (MPO) for the Louisville urbanized area. The Governors of Indiana and Kentucky designated KIPDA as such in December, 1973, and March, 1974, respectively.

With this designation as the agency responsible for the urban transportation planning process, KIPDA is responsible for carrying out, in cooperation with the States, the provisions of Section 134, Title 23 and Section 8, Title 49 of the U.S. Code, as amended.

By a Memorandum of Understanding between the Indiana Department of Highways, the Kentucky Transportation Cabinet and KIPDA executed in 1976, the Transportation Policy Committee (TPC) of KIPDA has the responsibility for cooperatively carrying out the urban transportation planning and programming process for the Louisville urbanized area. This includes responsibility for the review and approval of appropriate urbanized area transportation plans, whether short-range or long-range, implementation programs, such as the Transportation Improvement Program, and other similar related actions.

The Memorandum of Understanding establishes basic agreements on the transportation planning process, such as responsibilities, funding, establishment of the Transportation Policy Committee, membership of the committee and program contents.

The relationship of the KIPDA Board to the TPC is also addressed in the Memorandum of Understanding. The board is responsible for grants and contracts, aviation planning and programming and other appropriate transportation planning and programming affecting the region as a whole. The Unified Planning Work Program is subject to endorsement by the board in addition to the TPC.

The geographic area for the transportation planning process encompasses the urbanized area, as defined by the Bureau of the Census, and the area likely to be urbanized in the period covered by the long-range transportation plan, as agreed upon by KIPDA and the states.

ARTICLE II

Membership

1. The Transportation Policy Committee (TPC) membership includes the principal elected officials of general purpose local governments in the transportation planning area who are members of the KIPDA Board and representatives of major implementing agencies.

2. The membership includes voting and advisory members. Advisory members actively participate in all committee discussions. Advisory members do not have a vote in matters requiring committee action. Advisory members may not hold office.

3. Members, either voting or advisory, may be added to, or removed from the TPC by a two-thirds majority vote of voting members present, provided a quorum is present.

4. Attachment A presents the current membership of the Transportation Policy Committee.

ARTICLE III

Officers

1. The officers of the TPC shall be a chairman and a vice-chairman. These officers shall perform the duties prescribed by these bylaws and those outlined in the current edition of Robert's Rules of Order.

2. As cited in the 1982 Prospectus, the highest ranking officer of the KIPDA Board from the urbanized area who is also a member of the TPC serves as chairman of the TPC. If the chair is declined by such officer of the KIPDA Board, or if the chair otherwise becomes vacant, the TPC shall recommend by a two-thirds majority vote of members present, provided a quorum exists, a chairman to the KIPDA Board for approval. Board approval will install the selected chairman in office.

3. The vice-chairman may be elected by the membership at the first meeting of the calendar year.

4. No member shall hold more than one (1) office at a time, and no member shall be eligible to serve more than three (3) consecutive terms in the same office.

5. The director of the transportation planning division, or his designee, shall serve as recording secretary of the TPC.

ATTACHMENT A
MEMBERS OF THE TRANSPORTATION POLICY COMMITTEE (TPC)

August 5, 1994

VOTING MEMBERS

Bullitt County Judge/Executive
Charlestown Mayor
Clark County President of the Board of Commissioners
Clarksville President of the Town Board
Floyd County President of the Board of Commissioners
Indiana Department of Transportation - Programming
Indiana Department of Transportation - Public Transportation
Jefferson County Judge/Executive
Jefferson League of Cities
Jeffersontown Mayor
Jeffersonville Mayor
Kentucky Transportation Cabinet Secretary
Louisville Mayor
New Albany Mayor
Oldham County Judge/Executive
Regional Airport Authority Chairman
Shively Mayor
St. Matthews Mayor
Transit Authority of River City Chairman

ADVISORY MEMBERS

Federal Aviation Administration - Memphis Office
Federal Highway Administration - Indiana
Federal Highway Administration - Kentucky
Federal Transit Administration - Region 3
Louisville-Jefferson County Planning Commission
Regional Mobility Task Force
Transportation Technical Committee Chairman
U.S. Department of Housing and Urban Development

INTRODUCTION AND ORGANIZATION

INTRODUCTION

The Fiscal Year 1995 Overall Work Program outlines the scope of work to be undertaken by OKI, and illustrates the relationship between adopted goals, objectives and program activities. It outlines the general nature of these program elements, which are summarized by general categories, and are referenced to specific projects by project number.

Primarily a management tool for planning and coordination, the OWP provides the basis for cataloging and integrating OKI's activities into general categories. It delineates the programmatic and fiscal relationships essential for internal planning and programming of resources to achieve the stated goals.

STUDY AREA

The OKI region embraces an area of 2,630 square miles, with a population of 1,744,124 (1990) in Butler, Clermont, Hamilton and Warren Counties in the State of Ohio; Boone, Campbell and Kenton Counties in the Commonwealth of Kentucky; and Dearborn County in the State of Indiana. There are two Metropolitan Statistical Areas (MSA) in the OKI region:

- The Cincinnati MSA (which includes Cincinnati, Ohio and Covington and Newport, Kentucky) had a population of 1,452,645 (1990 Census).
- The Hamilton-Middletown, Ohio MSA had a population of 291,479 (1990 Census).

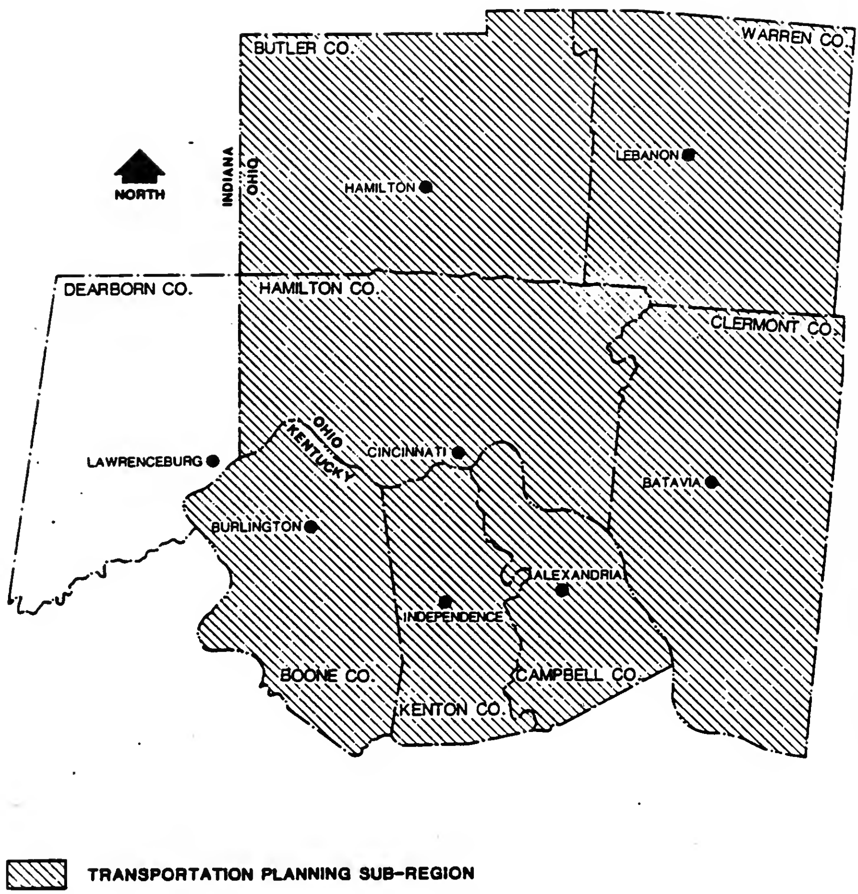
ORGANIZATIONAL HISTORY

In January 1964, the Ohio-Kentucky-Indiana Regional Transportation and Development Study was for-mally organized by local elected officials, representatives of the State Highway Departments, and plan-ning agencies in the Cincinnati metropolitan area. Its original purpose was limited to the preparation of a regional transportation and development plan, a condition for continuing receipt of federal assistance for highway construction in the urbanizing area, as required by the Federal Highway Act of 1962.

In 1967, the Ohio-Kentucky-Indiana Regional Planning Authority was incorporated as a "corporation not-for-profit" to continue "the Regional Transportation and Development Plan...and to engage in comprehensive planning". This transition was necessary so that OKI could become a legal entity able to contract directly with federal agencies.

In September 1973, under the Ohio Revised Code (Chapter 167), Section 65.210 et. seq. of the Kentucky Revised Statutes, and Section 53.1101 et. seq. of the Indiana Statutes, OKI reorganized into a Council of Governments to satisfy the Urban Mass Transportation Administration (UMTA, recently renamed the Federal Transit Administration, or FTA) requirements of "local public body". The Council operates by agreement of the participating counties and any changes in its structure must be agreed to by each county, providing a close link between elected officials of the counties and communities therein. The Executive Committee of the Council serves as the Metropolitan Planning Organization.

O K I REGION


BUTLER CO.
WARREN CO.
NORTH
INDIANA
OHIO
HAMILTON
LEBANON
DEARBORN CO.
HAMILTON CO.
CLERMONT CO.
OHIO
KENTUCKY
CINCINNATI
LAWRENCEBURG
BATAVIA
BURLINGTON
ALEXANDRIA
INDEPENDENCE
BOONE CO.
CAMPBELL CO.
KENTON CO.
TRANSPORTATION PLANNING SUB-REGION

ORGANIZATION

OKI is governed by a Board of Trustees and an Executive Committee. The Board of Trustees is empowered to control all activities of the Council of Governments. The Executive Committee has all the powers necessary to act in the name of the trustees. The Board of Trustees elects a President, First Vice-President, Second Vice-President and Treasurer. The OKI Executive Director serves as Secretary. The term of office for the members of the Board of Trustees, Executive Committee and elected officers is one year or until successors have been selected and qualified. The President serves as the Chairperson of the Executive Committee.

The Board of Trustees consists of:

- One official elected to the governing body of each member county;
- One elected official from each municipal corporation having a population over 5,000 (if any state in the region does not have a municipal corporation of this size, this member will be selected from the elected officials of the largest municipal corporation in the region within the state);
- One person selected from each area or county planning agency within the region;
- One person selected from each municipal planning agency of any municipal corporation having a population of over 40,000;
- Not more than ten non-elected residents of the OKI region;
- Such other elected officials, or persons responsible to elected officials, that the Board of Trustees may wish to select; and
- One person selected to represent each of the Departments of Transportation of the affected states as an ex-officio non-voting member.

The constituency of the elected public officials of the Board must represent 75 percent of the aggregate population of the OKI region, and at least two-thirds of the trustees must be officials elected by the residents of the region.

The Executive Committee consists of:

- The President, First Vice-President, Second Vice-President and Treasurer of the Board of Trustees;
- One trustee who is an official elected to the governing body of each member county, selected by such governing body;
- One trustee selected from each municipal corporation having a population exceeding 40,000;
- Three trustees selected from a municipal corporation having less than 40,000 (one from each state);
- One trustee selected from each regional planning agency;
- Three additional trustees selected by the Board; and
- Representatives from the State Departments of Transportation who are non-voting members of the Executive Committee.

Each member of the Executive Committee, with the exception of the non-elected residents, is allowed to name an alternate with all powers (including voting) to represent him or her at any Executive Committee meeting in his or her absence. The constituency requirements and length of term for the Executive Committee are identical to that of the Board of Trustees. The Board and/or the Executive Committee may create any committees they deem appropriate and necessary. Current standing committees include the Budget Committee, Steering Committee, Technical Coordinating Committee, Water Quality Advisory Committee, Air Quality Advisory Committee and Ridesharing Advisory Committee.

The Executive Director is the administrator of OKI, responsible for carrying out the policies and programs of the Board of Trustees and its Executive Committee and applicable federal and state laws and regulations. The Executive Director has the authority to employ, assign, supervise and release all employees of OKI, within the framework and general limitations and policies established by the Board of Trustees and its Executive Committee.

INTRODUCTION

The purpose of this Overall Work Program (OWP) is to set forth and describe the transportation planning process in the Ashland, Kentucky Urbanized Area (UA); and further, to identify the objectives, tasks and products to be accomplished through this process during Fiscal Year 1993-94. Included is a proposed budget for the year's activities, complete with an identification of the expected funding sources for said budget.

MPO Organization and Mission. In May of 1988, the Governor designated the FIVCO Area Development District as the Metropolitan Planning Organization (MPO) for the Kentucky portion of the Huntington, WV - Ashland, KY - Ironton, OH Urbanized Area. The KYOVA Interstate Planning Commission had previously served as MPO for this entire area, and remains as such for the urbanized portions of southeastern Ohio and western West Virginia. The FIVCO MPO's area of concern consists of certain sections of Boyd and Greenup Counties, Kentucky.

MPOs are designated entities which coordinate and direct transportation planning efforts in the nation's urbanized (greater than 50,000 total population) areas. The federal government requires MPOs to develop transportation plans, transportation improvement programs (with annual elements), and unified planning work programs, and to base such products on a "3c" (comprehensive, continuing, cooperative) planning process. The basic mission of the local MPO is to meet the federal requirements for both product and procedure, while focusing its efforts on the attainment of area highway and transit system needs.

Most of the FIVCO MPO's activities during the past five years have involved things (i.e., data base and traffic model development, staff training, committee formation, etc.) which were needed before actual work on the above stated mission could begin. After accomplishing the majority of these tasks, the past year the MPO has been dedicated in the development of a Long Range Transportation Plan. This plan will be completed this year and will accomplish the needed task of developing and defining community-wide transportation goals and objectives. A few of the upcoming responsibilities which will be placed on the MPO staff and committees during the upcoming fiscal year are: 1) Implement the goals and objectives spelled out in the new Long Range Transportation Plan; 2) Increase local familiarity with regard to the new transportation plans and programs; and 3) develop a program to comply with the Clean Air Act.

FIVCO has one (1) planner and its entire administrative staff involved in some aspect of the MPO's regular operation and maintenance. The MPO staff, in conjunction with a Technical Coordinating Committee (TCC), works under the direction of the MPO Policy Committee, a decision making group comprised of four (4) local elected officials, with representatives of the Kentucky Transportation Cabinet (KYTC), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA). The staff and TCC are responsible for providing technical advice and information to the Policy Committee, which in turn provides final authority and approval to staff generated work programs and plans. Another link in the MPO organizational chain is the community at large. It is the community which provides the MPO staff and

committees with a better understanding of local transportation values, goals and objectives. The MPO responds by offering technical information and explanation of programs to individuals and groups throughout the Ashland area.

The figure on the following page shows the interrelationships among the various organizational components of the FIVCO MPO.

A list of the MPO Policy Committee members is on page 4. A list of the MPO Technical Advisory Committee is on pages 5 - 8.

Budget Process. Funding for the transportation planning functions described in this OWP is made available by the FHWA, FTA, KYTC and the local city and county governments within the Ashland UA. This document is the basis for such funding and is, in effect, the common application for same.

The MPO staff initially develops a draft of the OWP, which is then reviewed by the various funding agencies and advisory committees. A final draft is ultimately prepared, reviewed and adopted by the MPO Policy Committee, and forwarded on to the appropriate state and federal funding agencies for approval.

Private Enterprise Participation. A private enterprise policy and procedures statement will be established and adopted annually by the MPO Policy Committee. The statement will emphasize and promote greater reliance on the private sector in the provision of mass transportation services, and encourage to the maximum extent feasible, the participation of private enterprise.

POLICY COMMITTEE
FOR ASHLAND MPO

1. Billy Joe Ross
   Boyd County Judge/Executive
   Boyd County Courthouse
   P.O. Box 423
   Catlettsburg, KY 41129-0423
   Phone: (606) 739-4134

2. Bobby Carpenter
   Greenup County Judge/Executive
   Greenup County Courthouse
   Room 200
   Greenup, KY 41144
   Phone: (606) 473-6440

3. Rudy Dunnigan
   Mayor, City of Ashland
   Ashland City Building
   P.O. Box 1839
   Ashland, KY 41105-1839
   Phone: (606) 327-2001

4. Ron McCloud
   Mayor, City of Worthington
   P.O. Box 366
   Worthington, KY 41183-0366
   Phone: (606) 329-6000

5. Don C. Kelly, Secretary
   Kentucky Transportation Cabinet
   State Office Building
   Frankfort, KY 40601

<u>Ex-Officio Members</u>

6. Paul E. Toussaint
   FHWA Division Administrator
   P.O. Box 536
   Frankfort, KY 40602

7. Peter N. Stowell
   Director, Southeastern Area
   Federal Transit Administration
   1720 Peachtree Road, N.W.
   Suite 400
   Atlanta, Georgia 30309

8. KYOVA Interstate Planning Commission
   1221 Sixth Avenue
   P.O. Box 939
   Huntington, WV 25712
   Phone: (304) 523-7434

EXHIBIT I

DESCRIPTION OF THE METROPOLITAN PLANNING ORGANIZATION

As defined, the Metropolitan Planning Organization (MPO) is "that organization designated by the Governor as being responsible, together with the state, for carrying out the transportation planning responsibilities within the urbanized area, and is composed of the principal elected officials of general purpose local governments with jurisdiction within that urbanized area. The Owensboro and Daviess County members of GRADD therefore, comprise the MPO as the Owensboro urbanized area currently encompases all of the City of Owensboro and a small portion of Daviess County.

The GRADD transportation study staff is only a portion of the MPO and is directed in its technical activities by a combination of three committees, the Policy Committee, the Technical Advisory Committee and the Citizens Advisory Committee. Additionally, the Owensboro-Daviess County Metropolitan Planning Commission and its staff make advisory input to both the Policy and Technical Committees. General guidance, as to the management of GRADD staff activities is provided by the Area Development District's Board of Directors and its Transportation Committee. A graphic presentation of this management structure appears in Figure 2. A listing of the various groups' memberships for fiscal year 1977 follows in Table 1.

The Transportation Policy Committee is the group responsible for setting policy for the expenditure of federal transportation funds. This group annually reviews the transportation plans and programs and annually endorses a course of action for the upcoming year. Also, the Policy Committee establishes policy for management of the Planning Program. It determines which areas the Study should address and also reviews and endorses findings of the Transportation Planning Staff. This Committee meets, at most, twice during the year. Most of the activities by the other groups in the study are directed toward the meetings of the Policy Committee and their resulting decisions.

The Technical Advisory Committee directs the Transportation Staff in the execution of the Planning Program. This Committee meets regularly with the Transportation Staff to advise it as to technical decisions which the Staff must make. Such things as the type of improvements proposed and the extent of the development within plans falls within the responsibility of the Technical Advisory Committee.

The Citizens Advisory Committee is designed to review planning activities in much the same manner as the Technical Advisory Committee, but with an increased emphasis on community values. This Committee makes advisory input into the Technical Advisory Committee and the Policy Committee.

The two staffs involved are the Transportation Planning Staff of the Green River Area Development District and the staff of the Owensboro Metropolitan Planning Commission. The GRADD staff is the lead staff which develops transportation plans and programs for consideration by the Technical Advisory Committee and the Policy Committee. This staff's activities are directed by the Technical Advisory Committee. The Planning Commission staff provides land use planning data for use in the study and participates on the Technical Advisory Committee.

In addition to those planning activities undertaken by the MPO, other transportation planning activities are undertaken within the urbanized area by both member agencies of the MPO and non-members. The City has four major divisions that figure directly in the Metropolitan Planning Organization planning process and are additionally totally responsible for management of the "off-system" highway network. These four city divisions are the City Engineer's Office, the Owensboro Metropolitan Planning Commission, the City of Owensboro Transit System and the Owensboro Police Department's Traffic Division.

The City Engineer's Office is primarily project-oriented, as it is responsible for all public works with transportation accounting for only a portion of its time. The City Engineer's Office is consulted on all highway projects recommended for implementation within the City by the transportation study. This office may also be instrumental in initiating or proposing a project as the transportation study is sensitive to needs perceived on the local level and accurately reflects the City's concerns.

The Owensboro-Daviess County Metropolitan Planning Commission (OMPC) is involved primarily in land use planning and therefore, indirectly influences the activities of the transportation study staff. The OMPC integrates the plan adopted by the transportation study with its comprehensive land use plan.

The Owensboro Police Department plays a small role in the City's transportation planning efforts. The Police Department is responsible for traffic regulation and speed control. The majority of the Department's activities involve regulatory enforcement, however, some measures include modifications to the highway network. Most traffic control signs, including intersection signing, speed signs and parking regulation signs are ordered placed by this Department, as well as some traffic signals.

The City of Owensboro Transit System, like the Planning Commission, does not maintain a planning staff, but rather relies upon the transportation study staff for all transit planning and programming. The transit operator (the City) is consulted regarding the prioritization and programming of transit projects. The transit operator is offered the initial review on any transit programming and its recommendations are adhered to primarily.

Daviess County has an Engineer's Office which participates in the transportation study. The County Engineeer's Office is also responsible for all county off-system routes within the urbanized area. Most of these routes are maintained primarily with state municipal aid funds as the areas which they serve qualify for the program based on population. The county is briefed regarding the planning of any projects and its recommendations are adhered to primarily.

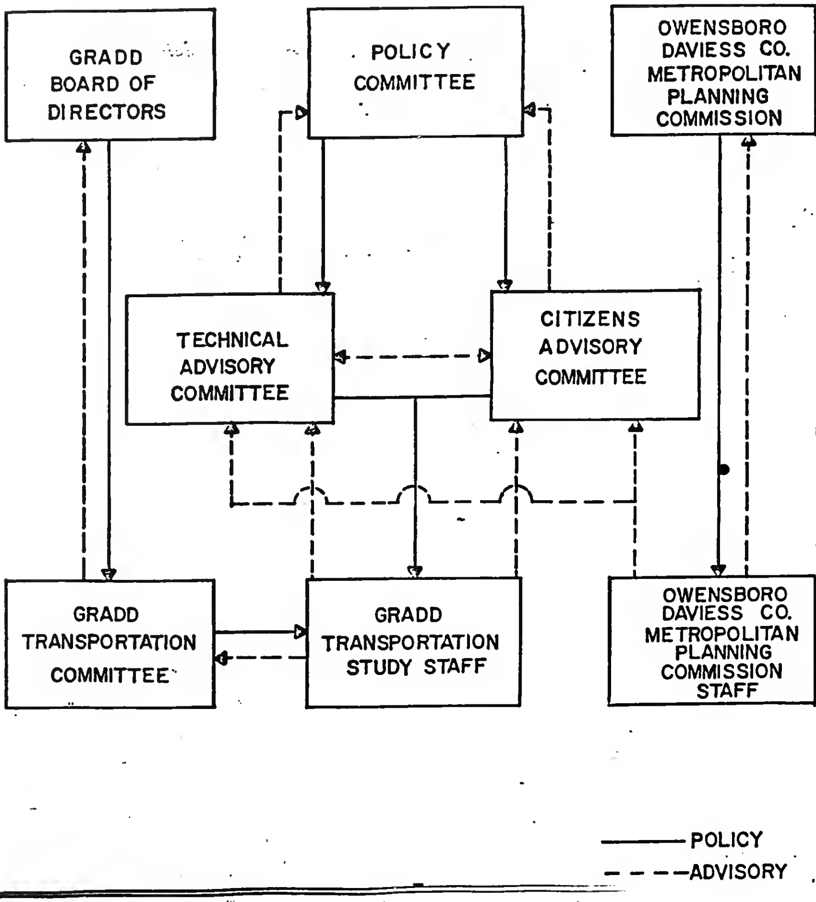
Other entities in the Owensboro urbanized area plan for the operation and management of their own services. The majority of these are para-transit operators. These operators directly effect the need for services through the operation of their own systems in the urbanized area.

Other agencies in Owensboro provide special transportation services as part of their overall programs. Five different social services, community action and community organizations transport different groups for various trip purposes.

FIGURE I

MANAGEMENT OF OWENSBORO

METROPOLITAN PLANNING ORGANIZATION



September 17, 1974

Mr. Calvin G. Grayson
Transportation Planning Engineer
Department of Transportation
Frankfort, Kentucky 40601

Dear Cal:

Following our meeting of August 7, at which we discussed the transportation planning process in the Lexington-Fayette Urban County, I have developed a new organizational structure with the help of members of the Council which will more accurately reflect the philosophy of broad community representation which is evident in the new merged government. I suggest three committee levels as follows:

1. POLICY COMMITTEE-composed primarily of local elected officials who will formulate policy concerning long-range and current transportation needs for the Urban County. In accordance with federal guidelines, it will be necessary for this Committee to approve any transportation project in the Urban County before it can be funded. The following people would serve on this committee:

    A. All Urban County Councilmen
    B. Mayor
    C. County Judge
    D. Secretary of the Kentucky Department of Transportation

2. TECHNICAL-COORDINATING COMMITTEE-composed largely of persons with special training and experience in transportation who will review the technical and design aspects of all proposed projects in the Urban County and make recommendations for approval or disapproval. It is anticipated that this Committee would organize itself into two subcommittees, a technical committee and a coordinating committee, for purposes of providing study in depth of each project. However, any final recommendation to the Policy Committee

ARTICLES OF AGREEMENT

This Agreement is made and entered into by and between the City of Evansville, Vanderburgh County, Town of Newburgh, Warrick County, of the State of Indiana and the City of Henderson of the Commonwealth of Kentucky for the creation of a governmental entity to be known as The Evansville Urban Transportation Study, upon the following terms, conditions, covenants, and agreements:

ARTICLE I

Creation, Area to be Included, and Authorization

Section 1. The Evansville Urban Transportation Study (hereinafter called "EUTS") is hereby created.

Section 2. The area to be included within the EUTS study area shall be the area of the counties which are members of the EUTS Policy and Technical Committee. The study area is a district made up of the City of Evansville and the Town of Newburgh, all of Vanderburgh County except Union Township, portion of Ohio Township of Warrick County, and the City of Henderson in Kentucky.

Section 3. This agreement is entered into pursuant to Indiana Code 36-1-7-1 et seq., and Section 65.210 of the Kentucky Revised Statutes.

ARTICLE II

Section 1. The EUTS shall have the power derived from the members of the EUTS Policy Committee in accord with statutes and these Articles of Agreement to do all things which Indiana and Kentucky law requires or permits it to do including the power to carry out the purposes set forth below, provided that the EUTS shall not have the power to do any act prohibited by the Constitution or statutes of Indiana in the State of Indiana or prohibited by the Constitution or statutes of Kentucky in the Commonwealth of Kentucky. Such powers shall include the power to appoint such Committees and advisory groups as the EUTS may deem appropriate to assist it in carrying out its purposes.

Section 2. The powers, authorities and responsibilities of the EUTS may be exercised to achieve the following purposes:

a. To be a public body and to provide such services within the study area as the applicable law will permit and the members, through the governing body of the EUTS, require in order to foster and develop better coordination, protection and satisfaction of the interests and needs of the governing bodies within the study area.

b. To provide coordinated planning services to the appropriate federal, state and local governments, their political subdivisions, agencies, departments, instrumentalities, and special districts, and to engage in transportation planning in, but not limited to, matters affecting the transportation network, capital improvements, metropolitan and regional developments, land use, health, welfare and safety and any other type of project essential to transportation planning and development within the study area. Such planning may be done directly by personnel of the EUTS or under contracts between the EUTS and private consultants.

c. To promote cooperative agreements, contracts and other compacts among and between the governments, their political subdivisions, agencies, departments, instrumentalities, special districts, and private persons, corporations and other interested agencies in the study area.

d. To receive and expend funds and grants from any federal, state or local government or any of their political subdivisions, agencies, departments, instrumentalities, or special districts or from any private or civic source; to contract with reference thereto, and to do all other things reasonably necessary to carry out the activities of the EUTS.

e. To take such other steps, to do such other things or undertake such other programs as are necessary or desirable to effectuate any lawful purpose of the EUTS, including without limitation, the supplying of all non-federal matching funds required by any application for federal funds submitted by the EUTS.

f. To establish and maintain an interstate, multi-county and metropolitan-wide public body which will be responsible for the formulation of area-wide transportation goals, policies and objectives for the economic, social and physical development within the study area and to prepare, develop and keep current a Transportation Improvement Plan for the area toward the attainment of these goals.

Section 3. The authority granted to EUTS by law or by these Articles shall not displace any existing municipal, county, regional or other planning commission or planning agency in the exercise of its statutory powers.

ARTICLE III

Governance

A. General

The activities of EUTS shall be conducted by the Policy Committee which shall act by vote of its members as provided in the By-Laws or through its Technical Committee by vote of its members as provided in the By-Laws. Any lawful act of the Policy Committee shall be an act of EUTS.

B. Policy Committee

Section 1. A Policy Committee is hereby created for purposes of conducting the activities of EUTS consisting of the following persons:

a. One (1) representative designated by the governing body of Vanderburgh County (County Commissioners), one (1) representative designated by the governing body of Warrick County (County Commissioners) and one (1) representative designated by the governing body of any county which becomes a member county. Additionally, the Vanderburgh County Council shall select one (1) of its members to serve as a member.

b. One (1) representative designated by each municipal corporation (City or Town) specifically including the Town of Newburgh and the City of Henderson, located in the study area, selected by the Mayor, Town Board, or governing body of the municipal corporation. The foregoing notwithstanding, the City of Evansville shall have three (3) representatives as members.

Section 2. The following persons shall be ex-officio, non-voting members:

a. A representative from the Urban Mass Transportation Administration.

b. Two representatives from the Indiana Federal Highway Administration.

c. Two representatives from the Kentucky Federal Highway Administration.

d. Three representatives from the Kentucky Transportation Cabinet.

e. One representative from the Indiana Department of Highways.

f. One representative from the Indiana State Board of Health.

g. Additional ex-officio, non-voting members may be added as required.

Section 3. Each representative shall serve until his successor is appointed.

Section 4. The EUTS shall make an annual report of its activities to the members of the Policy Committee.

Section 5. The members of the Policy Committee shall meet after execution of this agreement and shall elect from their membership, a Chairman and Vice-Chairman.

Section 6. The members of the Policy Committee may be elected officials, except as provided in Section 2 above.

Section 7. The Policy Committee shall prepare and adopt by-laws for the operation of the Evansville Urban Transportation Study.

C. Technical Committee

Section 1. The Technical Committee is hereby created. The Technical Committee shall be the working body of the Study and is directly responsible to the Policy Committee. The Technical Committee shall provide expertise, assistance, and data for all phases of transportation planning. It shall coordinate and review the work of the Staff and prepare reports and recommendations for the Policy Committee.

The Technical Committee includes decision makers, representatives of planning and technical agencies, and state and federal representatives.

The following persons shall be ex-officio non-voting members:

Chief of Urban Planning, Indiana Department of Highways
District Representative, Indiana Department of Highways
Chief Engineer, Indiana Aeronautics Commission
Director, Kentucky Transportation Cabinet

BY-LAWS OF THE
CLARKSVILLE URBAN AREA METROPOLITAN PLANNING ORGANIZATION
EXECUTIVE BOARD

ARTICLE I - NAME

The name of the organization shall be the Clarksville Urban Area Metropolitan Planning Organization Executive Board.

ARTICLE II - COMPOSITION

The Executive Board shall be composed of principal elected officials of governmental jurisdiction participating in the Clarksville Urban Area Transportation Planning Process. Membership by jurisdiction is as follows:

Governor	State of Tennessee
Governor	Commonwealth of Kentucky
Mayor	City of Clarksville
Judge	Montgomery County, Tennessee
Judge	Christian County, Kentucky

One elected official of the Pennyrile Area Development District in Kentucky.

One elected official representing the Mid-Cumberland Council of Governments and Development District.

**STATEMENT OF GORDON J. LINTON
ADMINISTRATOR
FEDERAL TRANSIT ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION**

**BEFORE THE
HOUSE INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
JULY 21, 1994**

Mr. Chairman, members of the Committee, I am pleased to have this opportunity to appear before you today to discuss the Federal Transit Administration's role in this very challenging intermodal IVHS effort. Since the promising new technologies we are discussing this morning can be applied to all modes of surface transportation, and not just to highway vehicles, for purposes of my testimony I will use term ITS--Intelligent Transportation Systems-- in describing them. I think that the term ITS is much more descriptive than IVHS.

In furtherance of the policies in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), we are working with the Federal Highway Administration (FHWA) and other elements of the Department to establish a truly multimodal National Transportation System, and we believe that the Department's ITS initiative will play a critical role in that effort. Just as these advanced communications and information system technologies have begun to bring about efficiencies in the private sector, so too will they have similar impacts in the delivery of transportation services in the public sector.

As you know, Mr. Chairman, automobile congestion has been increasing, despite a variety of efforts to turn this trend around. Communities are struggling to develop transportation systems that provide access and mobility and minimize pollution and congestion. Now, however, public transit participation in the national ITS program offers a real opportunity for our local communities to develop the means to improve transit's flexibility and convenience, thereby increasing transit use.

Intelligent Transportation Systems offer a variety of new tools to local communities and planners, and new ways to improve access and mobility. ITS technologies offer public transportation the opportunity to improve significantly customer service and convenience. While ITS should enable transit providers to attract new riders from their automobiles, just as important is what these technologies offer our core customers--those without the automobile option. Improved customer information and more user-friendly transit will help everyone, and will be particularly useful for those with physical limitations.

Mr. Chairman, I think mass transit is an ideal way to introduce a large segment of the American public to smart technologies, and how they can help meet our nation's transportation challenges. We are already beginning that process, which I will discuss shortly. In addition, as industries shift from defense to other applications, these transit-related technologies present new opportunities for investment.

MASS TRANSIT ITS APPLICATIONS

Mr. Chairman, let me describe for you some real examples of where FTA is helping ITS become operational in the transit industry. And let me note that we are doing this through FTA's Advanced Public Transportation Systems, or APTS, Program. APTS was established to focus all of our transit activities in support of the national ITS initiative.

I will begin with traveler information systems, which have great potential to improve customer service and convenience. The Los Angeles Metropolitan Transportation Authority is installing information kiosks that allow customers simply to touch a screen to select information on the most convenient form of transportation, from a transit bus to finding a group of people to rideshare with for a particular trip. The customer may also get a printout of the information. The system is even tied into the Statewide healthcare information kiosk network, and may offer further opportunities for interagency cooperation and efficiency.

Let me emphasize here, Mr. Chairman, the importance that ITS activities play in the area of automatic fare and toll collection, with the ultimate goal a universal multimodal toll and fare collection system. Regarding fare collection innovations, the farecards that we use for Metrorail here in Washington, D.C., are only the first generation of what promises to be a versatile tool. The Washington Metropolitan Area Transportation Authority (WMATA) is testing a proximity smart card system that remotely reads and debits the card through radio waves--the card never leaves the customer's hand. Future

farecards may be the same card you use for automatic teller machines. Solid plastic with an integrated microchip, they would be used for buses, parking, and buying gas. They could also be integrated with multiple transit operators and electronic toll collection systems, thereby providing a single payment medium for all transportation in an area.

Other fare innovations are occurring in Ann Arbor, Michigan, where the local transit operator is implementing a system that will combine the city's parking payment and fare payment systems. A smart card will be the common payment medium for both bus fare and parking. Prices will be structured to encourage the use of transit, and offer incentives for drivers to take transit at least one or two days a week.

An especially exciting aspect of the intermodal ITS effort is the opportunity it provides to make transit an attractive alternative to the automobile. I am particularly interested in the potential of coordinating transit operations with traffic management, and evolving traffic management into transportation management. By enabling traffic operations centers to emphasize the efficient movement of people, instead of vehicles, ITS should increase the convenience of transit and increase the efficiency of the overall transportation system as well. For example, in Chicago, buses along a major route will be tracked to determine when it would be useful to alter traffic signals to restore consistent intervals between buses and return them to schedule.

In Baltimore, the Maryland Mass Transit Administration has been operating an automatic vehicle location system installed on

50 buses, which are controlled through two computer consoles with digital map displays. The system uses geographic information systems (GIS) to display actual bus locations contrasted with scheduled locations. Once the location of a bus is transmitted electronically to the dispatcher, two-way radio communication enables corrective action for off-schedule buses. Eventually, the system will be expanded to include all 900 Baltimore transit buses and the Global Positioning System (GPS) will be used to track the vehicles. Indeed, system-wide applications of the GPS vehicle location system and related GIS displays are already being made in Denver, Milwaukee, and Dallas.

The Metropolitan Transit Authority in Houston, Texas, is ready to launch a test of their smart commuter program. It will include a sophisticated real-time traffic and transit information system with continuous updates on transit and traffic conditions, bus choices and carpool options to travelers both at home and at work.

Another example of an innovative technology application is in Seattle and Bellevue, Washington, areas that are using a computerized information center to allow people to match up with carpools or vanpools. Participants carry electronic pagers to make ridesharing easy and versatile. We learned that 42 percent of drive-alone commuters would consider the instant ridesharing made possible by such a system.

A rider's daily commute may soon begin by logging onto a home computer. One program will determine if any members of the

carpool are out sick; another will check for commuters looking for a carpool in the area.

Ridesharing groups using high occupancy vehicle (HOV) lanes are finding such electronic communications invaluable. They can find an immediate replacement when a regular rider is out sick and still continue to use the HOV lanes. The system is also useful to people who only occasionally need to catch a ride.

As these examples show, smart technology is not an automobile issue or a highway issue or even a transit issue. Its success will depend on a coordinated effort involving all modes of transportation in better serving the travel needs of the American public. And these examples --with new ones coming every day-- barely scratch the surface of the dozens of exciting technological advances that are being researched, tested and demonstrated as they move toward widespread use in our nation's mass transit systems.

FTA PROGRAM

Mr. Chairman, let me now discuss some additional activities that the FTA has undertaken in this area. I have just described some examples of the operational tests that FTA is assisting through our APTS program, which as I noted earlier is a component of the Department's ITS program. FTA is also involved in a number of activities to bring about the testing, evaluation and deployment of ITS. The focus of our activity is on the transit riding public, our customers, and what we can do to better serve their travel needs.

Through the APTS program FTA will also ensure that transit-related, environmentally-friendly ITS systems are widely implemented beyond operational test stages. Results of the operational tests and evaluations of new technologies will be shared with such groups as transit operators, Metropolitan Planning Organizations (MPO's), and the planning community. For these technologies to reach their potential to improve transit, they must first be considered in the local planning process leading to investment decisions on the content of the transportation improvement plan. Accordingly, the APTS operational test evaluations focus on those issues important to local communities. We ensure that evaluations address the capability of the technology application to affect transit problems, increase ridership, reduce congestion and improve air quality. Hard data on benefits, performance and reliability are also needed. Mr. Chairman, you and I have been through these tough resource allocations decisions and know the need for such useful and practical information.

To conduct the necessary evaluations, FTA is using the Volpe National Transportation Systems Center to ensure that evaluations are performed in a consistent, standard manner. To date, the Volpe Center has developed a set of Evaluation Guidelines, and has put together an evaluation team which has begun to develop site specific evaluations.

To further get the word out to the transit community about ITS, FTA, through the APTS program, is putting transit operators interested in ITS in touch with key professionals involved in the

operational tests. Networking among peers has been found to be one of the major mechanisms for transferring new ideas. We are facilitating this process where professionals involved with the APTS operational tests may then give their peers the results of their first hand experience.

As MPO's and State DOT's highway and transit interests work to develop efficient transportation systems, the greater funding flexibility provided by ISTEA offers the opportunity to develop more comprehensive programs and projects, such as joint FTA/FHWA multimodal ITS systems. By providing State and local transportation authorities the financial capacity and programming flexibility to support efficient and environmentally sound transportation projects, ISTEA provides the basis that will enable transit ITS to be deployed.

CONCLUSION

Mr. Chairman, let me conclude my testimony by reiterating that ITS technology applications are going to be found to positively affect local transportation problems. FTA's efforts are focused on providing local policy makers and professionals with reliable information on ITS to help them select the best technology for their particular needs as they make critical investment decisions.

Thank you, Mr. Chairman, for providing me this opportunity to share FTA's perspective on this important program. I will be pleased to answer any questions you may have.

STATEMENT OF ROBERT G. MACLENNAN

TESTIMONY OF THE

AMERICAN PUBLIC TRANSIT ASSOCIATION

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

OF THE

HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

****

ADVANCED PUBLIC TRANSPORTATION SYSTEMS

July 21, 1994

SUBMITTED BY

American Public Transit Association
1201 New York Avenue, N. W.
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APTA

APTA represents over 1100 members, including all major commuter rail operations, motor bus and rapid transit systems, and organizations responsible for planning, designing, constructing, financing and operating transit systems, APTA members include business organizations which supply products and services to the transit industry, academic institutions, and public interest groups.

Introduction

Mr. Chairman and members of the Subcommittee, the American Public Transit Association (APTA) appreciates the opportunity to testify on the U.S. Department of Transportation's Intelligent Vehicle-Highway Systems (IVHS) program as it relates to public transportation.

On behalf of the Association and transit riders throughout the nation, I thank you and the members of the subcommittee for your support of investment in the nation's public transportation infrastructure. We also compliment the Chairman for holding these hearings. They are timely and will hopefully enhance the nation's effort on IVHS and Intelligent Transportation Systems (ITS) generally.

Our testimony focuses on the questions posed by the subcommittee. But before we turn to the questions, we would like to comment briefly upon the goals and progress made to date on the overall IVHS/ITS program.

IVHS Program Goals

Transit has an increasingly important role to play in implementing the Clean Air Act Amendments of 1990. Among the ecologically sound actions our citizens can take for our cities are traveling by bus or train on a regular basis, because multi-occupant travel cuts down on air pollution by removing single occupant vehicles from the roads.

One of the ways that we transit agencies will attract more riders into our systems is by implementing more IVHS technologies. These technologies will make our transit systems more appealing to current passengers and help us attract new riders. We want to do that because we know that vibrant transit systems have to play an important part in transporting Americans.

The effects of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), have been far reaching. First and foremost it has stimulated those of us in diverse areas of transportation to get to know each other better and to work more closely together for the good of our individual regions.

That has been very beneficial for the nation's transportation delivery as a whole. Prior to the passage of ISTEA, the tendency in transportation was for the state departments of transportation to plan their freeways, the counties to plan their highways, the cities to go about their traffic management tasks and the bus and train companies to plan their routes, all in isolation. No more.

We hope this testimony we give today will inspire you to encourage more active inclusion of transit in this cooperative planning process. We believe IVHS can lead to a more intelligent transportation future with an interconnected system of transportation alternatives, improved accessibility and efficiency. We in the professional organizations want to increase the education of our members on these points so they will understand the great changes that are about to take place in transportation.

Calling the Intelligent Vehicles and Highways Systems program by a new name: "Intelligent Transportation Systems," as has been proposed, is a step in the right direction. APTA encourages this move. We also encourage the increased investment in these technologies so that improved access to goods and services comes about not only with a decrease in vehicle miles traveled, but also with a corresponding increase in the use of public transportation. Investment should also be directed at making more efficient connections between modes so that travellers can use all of the transportation infrastructure and quickly obtain information that enables them to avoid bottlenecks.

New Technology Can Increase Ridership If Accompanied by Other Changes

IVHS America proposes to increase transit ridership by making transit systems more "user friendly" through incorporation of new technologies known as Advanced Public Transportation Systems (APTS). They plan to implement this technology on three levels:

1.) internally, to transit agencies through computer technology to improve transit operations, planning and management functions;

2.) externally, to the customer by providing real-time transit service information to the customer at home, transit station and bus stops;

3.) by promoting intermodalism by improving connections with other transport systems.

These steps should be taken in conjunction with the examination of a number of other technologies which will benefit the total transportation infrastructure of a region. Some of these other areas of exploration include, but are not limited to:

- congestion pricing experiments, especially during peak traffic hours;
- central traffic control facilities;
- the expansion of high occupancy vehicle lanes;
- bus and emergency vehicle override for traffic signals;
- improved synchronization of traffic signals;
- laws cashing out employee parking;
- vanpooling and other shared-ride services
- making better use of surface arterials by the creation of urban clearways and busways; and
- enhanced freeway accident removal capabilities.

Funding for APTS Research and Deployment Needs to be Increased

APTS has received a relatively small share of the IVHS/ITS research budgets -- only about 9 percent. Transit receives about 20 percent of combined transit and highway spending, down from 34 percent in 1981. Funding for APTS research and deployment must increase if IVHS/ITS is to achieve goals of reducing congestion and improving accessibility. We would like to see it increase at least to 20 percent of the current budget.

Response to IVHS Implementation Questions

What is APTA's role in the development and implementation of intelligent transportation systems? What steps are being taken to ensure an appropriate and timely deployment program in coordination with existing research programs?

APTA represents U.S. transit systems that provide 97 percent of our nation's mass transit services. APTA's members also include manufacturers, suppliers and other businesses that provide goods and services to the industry. APTA's objectives include: promotion of research and investigation to improve public transit; to provide a medium of exchange to represent the interest, common policies, requirements, and purposes of the operators of pubic transit; and to provide a medium for exchange of experiences, discussion and comparative study of public transit affairs. APTA also coordinates selection and dissemination of transit research projects through the Transit Development Corporation and the Transit Cooperative Research Program.

Public transportation systems have been leaders in the development of advanced vehicle technology, and many have for decades utilized technologies described by IVHS America like Automated Vehicle Location (AVL) systems and Automated Guideway Systems.

APTA has participated in several research projects specifically related to IVHS/ITS and also sponsors "CompuTran" a series of computer workshops to enhance productivity and to allow transit professionals the opportunity to discuss and exchange experience using modern computer technology. In addition, APTA conferences have included seminars to inform the industry about the benefits of intelligent transportation technology, and we are also working with IVHS America to respond to a FCC request to identify transit radio spectrum utilization requirements through the year 2010.

APTA is also an active member of the IVHS America Communications Task Force.

Because most of the Intelligent Transportation System transit research is occurring in the private sector outside of the transit industry, few steps have been taken to ensure an appropriate and timely deployment of advanced public transportation systems in existing research programs.

We would like to see the FTA play a larger role in coordinating ITS research activities.

What resources and strategies are being devoted to developing and implementing intelligent transportation systems technology that will make public transportation a more attractive option for travelers, so as to reduce congestion and attain air quality goals?

So far, most of the new operational tests selected by DOT focus on providing transit information and personalized public transit. We support operational testing that focuses on

optimizing the use and performance of public transportation. Promising technologies include:

Real-Time Transit Information Systems. These systems provide real time traffic information about the availability of transit alternatives. They will allow customers, through the use of their home computers and information kiosks at transit stops, to know precisely when a bus or a train is going to arrive. Reducing uncertainty and waiting time will help transit ridership increase. These systems will also improve ridesharing, vanpools and paratransit services. Customers will be able to tap into a network with mobile communication devices and at information kiosks to know when carpooling and vanpooling are available. This technology will improve demand responsive, shared-ride services for the young, elderly and people with disabilities by allowing quicker responses.

Alternate Bus Routing System. Technologies are being developed that can let buses receive travel priority in congested areas. For example, New Jersey Transit is experimenting with a system to give some of its buses a competitive edge. They receive real time information on traffic congestion that allows drivers to chose the best route of travel.

Communication and Operations Management. Advanced operation technologies will improve the management of transit systems. These services will improve the quality of transit service by improving maintenance and will also serve to improve on-time performance. They will generate ridership data that will help transit managers better plan routes and utilize rolling stock effectively.

Automatic Vehicle Location Technology (AVL). This technology can be used to locate vehicles on the road which can improve on-time performance and vehicle security. This technology can also be utilized to facilitate the generation of real-time schedule information. In Baltimore, the Mass Transit Administration is operating an automatic vehicle location system installed on 50 buses. Once the location of a bus is transmitted electronically to a dispatcher, two-way radio communication enables corrective action to buses that are off-schedule.

Smart Fare Cards. These are farecards with computer chips that will expedite the process of boarding and exiting transit vehicles. The cards may also be used to pay for parking and other items including newspapers and coffee.

The Houston Experience

Houston Metro is implementing a number of Advanced Public Transportation Technologies as a total program for the METRO region in concert with the Texas Department of Transportation, the City of Houston and Harris County.

Portions of Houston's federally funded Regional Bus Plan are subsidizing IVHS technology. And an IVHS experiment called the "Smart Commuter" with a federal contribution of $17

million and local contributions of $5 million is underway.

An operational test of the "Smart Commuter" program will include a real-time traffic and transit information system that will provide continuous updates on traffic conditions, bus choices, and carpool options. These operational tests are linked to METRO's HOV lane network and the IVHS improvements that are being implemented there, such as electronic signage, ramp metering on the freeways, and video cameras trained on the freeways to disclose traffic congestion.

As part of their $1 billion Regional Bus Plan, Metro is also installing electronic registering fareboxes and automatic passenger counters that will give it better information, and allow it to better plan schedules. Electronic signage will tell passengers when the next bus will actually arrive. Automatic passenger counters will register the locations passengers board buses, and as buses approach the stops downtown, an enunciator system will call out the name of the next stop. Electronic signage will tell the hearing impaired when their stop approaches. As Houstonians ride the bus down HOV lanes, IVHS enhancements will automatically monitor engine conditions, brake conditions, and air conditioning output.

All of these bus enhancements will be linked together with an industry standard connector--the J-1708. This standard connector is being developed by an APTA committee with IVHS America support under the leadership of one of METRO's employees. It is an important agreement and will be adopted across North America.

Another portion of Houston's Regional Bus Plan is synchronization of traffic lights. Intersections will "talk" to each other to facilitate traffic flow. This and other IVHS technology will be operated from a central control facility which is a joint project of METRO, Texas DOT, and the City of Houston. METRO has a charge to solve traffic congestion and improve general mobility. One of the nation's ten largest cities, Houston is the only one to have experienced continuous declines in traffic congestion since 1984.

Are steps being taken to provide for the special needs of metropolitan areas to deploy and maintain traffic management systems? What funding sources would be available for metropolitan traffic management systems?

Legislation giving MPOs a stronger role in coordinating IVHS and transit efforts would be helpful. Full funding for MPO planning functions is needed as many MPO's are still understaffed and struggling to carry out their responsibilities under ISTEA. ISTEA National Highway System, Surface Transportation Program and Congestion Mitigation funds would be good sources of funding of IVHS traffic management systems. Also full funding for the authorized transit program, including research and development and formula programs, would enable transit operators to experiment with and apply ITS.

Is architectural design standards-setting being coordinated to ensure that the intelligent transportation systems will be implemented in a nationally coordinated manner?

Standardization of these intelligent vehicle technologies is very important and we are getting some, but we need more. We enthusiastically encourage more FTA support and leadership in this area because standardization will make this technology compatible with and effective for all transit agencies. Even more importantly -- standardization should bring the costs of technology down.

We would also encourage the coordination by the Department of Transportation of transit technology with the Defense Department Conversion Program and the Commerce Department National Institute of Standards and Technology.

What major constraints, including environmental, financial, institutional, and legal, have been identified to the research, development, and deployment of intelligent transportation system technology? How would you propose that these constraints be overcome?

Funding is a serious constraint that will prevent many transit agencies from deploying ITS systems. Over the next 20 years, projections are that more than $200 billion will be spent on IVHS. Although some of these expenditures will come from the private sector, a significant share to deploy these systems is also expected to come from the public sector. Unfortunately, U.S. transit operators will be hard-pressed to provide funding to deploy new technologies. Many are in weak financial condition, and the looming possibility of federal cutbacks could make this situation worse. Basic transit operating and capital funding needs are about $40 billion annually -- $15 billion more than current available resources. In order to finance IVHS/ITS deployment transit agencies will need assistance from all level of government.

How does the United States compare with other nations in IVHS deployment and commitment of resources?

European and Japanese public budgets have devoted money to research and development of new transit technologies over an extended period of time. As a result, many IVHS technologies are already in place. For example, many elements of real-time passenger information systems, which allow passengers to know in their home or at a bus stop when the next bus will come, have been in place in France and Japan for over a decade.

Public Transportation in the U.S. is playing catch-up, which is one of the reasons federal funding is necessary.

How is the conversion of defense-related technologies to civilian use contributing to the development of IVHS technology, and how is this process being facilitated?

The conversion of defense-related technologies to civilian use is contributing greatly to the development of Advanced Public Transportation System. The Northrop-Grumman Corporation is working to apply defense technologies to buses. In Los Angeles, the company is working to establish an advanced technology bus. In addition, San Francisco's BART, Hughes Aircraft, and Morrison-Knudsen are using a $19.5 million Department of Defense grant to develop an Advanced Automatic Transit Control system that will double capacity during the rush hour. While we encourage DOD action, many of the projects are being undertaken with limited coordination by the Federal Transit Administration, and we recommend that the FTA and the industry play a greater coordination role in these efforts.

In addition, we would note that the market for transit-related application of defense-related technologies is not unlimited. The lion's-share of current funding resources for transit must out of necessity be devoted to meeting operating costs and maintaining or replacing existing capital infrastructure and rolling stock. We make this statement only out of recognition of current fiscal realities at all levels of government.

Conclusion

Advanced Public Transportation Systems are an excellent way to make transit systems attractive to new riders. We hope you will place greater emphasis on access by citizens to goods and services without their significantly increasing vehicle miles traveled. Multi-occupant vehicles are an important part of the solution to the pollution that threatens many cities. Advanced Public Transportation Systems -- transit's side of intelligent transportation programs -- needs more IVHS expenditures to support the development and standardization of these technologies for all Americans.

We at APTA have a responsibility to educate our profession about the benefits of these technologies and what they can do to make more enticing transit systems. We are trying to do that. We transit professionals also need to open up our minds to cooperative transportation development with other transportation agencies. That is a process already under way.

Congress can do its part by pressing for increased standardization, increased research, and increased funding for these projects. All Americans will be grateful, our transportation needs will be better addressed, and our nation will ultimately be more competitive internationally.

STATEMENT OF RODNEY E. SLATER
FEDERAL HIGHWAY ADMINISTRATOR
U.S. DEPARTMENT OF TRANSPORTATION

BEFORE THE
HOUSE INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
JULY 21, 1994

INTELLIGENT VEHICLE-HIGHWAY SYSTEMS

Mr. Chairman, I am pleased to appear before the Committee, along with Federal Transit Administrator Gordon Linton, to represent the Department of Transportation at this hearing. I commend you and the Committee for calling this hearing. I am excited about the Intelligent Vehicle-Highway Systems (IVHS) program -- or Intelligent Transportation Systems as many are now beginning to call them. As U.S. surface transportation policies evolve from constructing new facilities to more effective operation and maintenance of existing facilities, we envision that IVHS technologies will play a significant role, particularly on the new National Highway System called for by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).

I would also like to commend you, the Committee, and the entire House of Representatives for timely passage of the bill designating the National Highway System (NHS) and for your strong support for the development of a National Transportation System. Both the National Highway System and the National Transportation System initiatives will play critical roles in our transportation future. Simply put, we cannot have a strong National Transportation System without first laying its foundation -- the National Highway System.

Once adopted by Congress, the NHS will allow every level of government to better target its transportation investments in coming years. Much funding authorized by ISTEA, as much as $21 billion, will be directed towards the NHS, and State governments will have strong incentives to match or surpass these efforts.

As a former Chairman of the Arkansas State Highway Commission, I have a great deal of respect for the expertise and dedication of those in the transportation profession. I'm proud to now serve with this group of transportation professionals at the national level and to be in on the ground floor of IVHS.

I am pleased to have with me today Dr. Christine Johnson, the Director-designate of the Department's new Joint IVHS Program Office. Dr. Johnson brings with her a wealth of experience in the transportation field in both the public and private sectors. She served as the Assistant Commissioner of Policy and Planning for the New Jersey Department of Transportation, and most recently in a high ranking position in the private sector. She also served on the Board of Directors of the Intelligent Vehicle Highway Society of America, or IVHS AMERICA.

IVHS AMERICA is a nonprofit scientific and educational society that represents a broad coalition of over 500 public and private members that are working with the Department to advance the National IVHS program. It is also chartered as a Federal advisory committee to the Department on IVHS issues, and we utilize it extensively.

Last April, I attended the Fourth Annual Meeting of IVHS AMERICA. I was struck by the degree of public and private activity in this arena, as well as the wide variety of technologies being discussed and displayed. Having also attended the Third Annual meeting the year before, I was amazed at how these technologies had matured in such a short period

of time, and how dramatically the number and variety of public and private sector participants has expanded.

President Clinton and Secretary of Transportation Federico Peña share a strong commitment to harnessing technology to improve our transportation system. They believe that transportation must play a key role in the Nation's long-term, sustained growth. To this end, Secretary Peña has established a straightforward set of goals for our Department. I would like to share these with you and discuss how the IVHS program can help us achieve these goals.

First, one of the Department's highest priorities is to get our economy moving through strategic transportation investments. IVHS holds particular promise in helping to achieve renewed economic prosperity through the creation of new industries and consumer markets. Numerous large defense firms are active participants in the IVHS program, and we have established working relationships with several Department of Defense elements, such as the Advanced Research Projects Agency and the Army Tank and Automotive Command, to foster the conversion of applicable defense technologies to IVHS uses.

Second, we must ensure that our investments improve daily life by making travel safer, more convenient, and more "human." This is where the real excitement with IVHS lies: in its potential for saving lives, for moving freight more effectively, and reassuring drivers and the public that vehicles and roads are safe. Although our Interstate highways are the safest in the world, I am personally committed to ensuring that roadway safety on all routes remains a very high priority. For example, with the welcome involvement of Members of Congress, I am following and fully supporting the efforts of the Capital Beltway Safety Team. This group is examining means to improve safety on the Beltway, working with multiple State and local jurisdictions in an effort that will utilize technology to make

meaningful safety improvements and showcase what can be achieved on our highways. This is the epitome of good government in action.

Our third goal is to ensure that transportation investments are made in ways that will assist our environmental efforts. IVHS technologies that enhance carpool and transit services could lower the number of single occupancy vehicles on the road. The result would be less congestion and reduced vehicle emissions and energy consumption.

Fourth, we must advance transportation technology and expertise. The Department is working very closely with technology leaders throughout the Nation, including universities and the National Laboratories, to ensure that those managing advanced transportation systems have the necessary tools and skills. We need to make the application of IVHS technologies the "standard practice" rather than the exception.

Fifth, and perhaps most important, we must integrate all modes of transportation into a seamless intermodal system for moving goods and people. The application of IVHS technologies will be crucial to the creation of a truly intermodal National Transportation System.

Status of the IVHS Program

The IVHS program is a private/public partnership in all respects. Using the resources provided by Congress, the Department and its partners have been extremely busy and productive establishing the National IVHS Program. This National Program will meet the goals and objectives established in the Intelligent Vehicle-Highway Systems Act of 1991, which is a part of ISTEA.

In June, we delivered to Congress our first report on the Department's Implementation of the National IVHS Program Plan, copies of which have been provided to the Subcommittee. This report highlights the many significant accomplishments we've made

so far in advancing the National IVHS program. Let me briefly describe some of our success stories:

- We have initiated an extremely effective alliance with the many diverse private and public sector organizations which have a stake in the IVHS program. As I'll discuss in a moment, this alliance permeates all aspects of our program.
- We are also successfully fostering cooperation among the Department's modal administrations for individual IVHS projects, as well as for overall IVHS program management. The new Joint IVHS Program Office will be truly intermodal, with staff from the Federal Transit Administration and the National Highway Traffic Safety Administration, as well as from throughout the Federal Highway Administration. The Joint Program Office will serve as the Department's executive agent for management and oversight of the Department's intermodal IVHS program, policy, and budget. This includes IVHS-related activities undertaken by the Research and Special Programs Administration's Volpe National Transportation Systems Center.
- We are currently participating with the Federal Transit Administration and the National Highway Traffic Safety Administration in numerous research projects and operational tests which feature safety and intermodal applications in the development of IVHS user services. The full integration of transit and other modes into our Nation's transportation system is also an important aspect of the national IVHS systems architecture development. In addition, current studies indicate that transit applications on the automated highway system could be a natural "early winner." Transit applications are a major, cross-cutting element of the Department's IVHS program.

- We have initiated efforts to learn more about critical IVHS institutional, technical, and program delivery issues. Our <u>IVHS Strategic Plan</u>, which we delivered to Congress in December 1992, is designed to address these issues. In June, we delivered a report to Congress on <u>Nontechnical Constraints and Barriers to Implementation of IVHS</u> that identifies and addresses the nontechnical challenges that will most directly affect the success of IVHS deployment.
- We have established an ambitious national program planning effort to ensure coordination and integration of IVHS activities in the public and private sectors. Along with our partners, we have completed the second draft of a comprehensive <u>National IVHS Program Plan</u> that outlines the research, development, and testing activities needed to reach deployment of a full range of inter-related IVHS user services. Government, the private sector, and other interested groups have joined together to produce a document that will serve to guide cooperative public and private development and deployment of a major national transportation program. The first edition of this landmark document will be completed in December 1994. It will continue to evolve over time to reflect changes in Government policy, technology, and market conditions. It will serve as an important guide for investment decisions by the Federal government, State and local governments, and the private sector. In addition, the National IVHS Program Plan will ensure that program activities are focused so as to lead to deployment of IVHS services in a nationally compatible system.
- We have sparked considerable private and public sector interest and involvement in the National IVHS Program, including the National Laboratories and defense-oriented companies. We continue to accelerate partnerships in major program areas

such as development of the National IVHS Program Plan, operational tests, and research and deployment efforts.

- We have initiated a three-year process to establish the overall national IVHS system architecture to ensure national compatibility of IVHS systems. This architecture, which I will discuss more fully later, will establish a framework for IVHS functions and communications interfaces that will permit evolutionary improvements to IVHS, while maintaining a competitive marketplace for the development of compatible private sector goods and services. These goods and services could then be sold in the international marketplace, thereby helping to strengthen the competitive position of United States companies.
- The National Highway Traffic Safety Administration (NHTSA) is making good progress in its research on the potential safety benefits of IVHS technology. NHTSA's efforts in this regard have two major objectives: (1) to facilitate the development and deployment of advanced systems that help drivers avoid crashes; and (2) to ensure that these systems do not create adverse safety effects.
- We are identifying and analyzing key issues and questions associated with the development of an automated highway system and initiating studies and plans towards having a prototype test track demonstration by 1997 as required by ISTEA.

The Key Role of Public/Private Partnerships in IVHS

Implementing a nationally compatible system of IVHS technologies and services in the United States will depend upon unprecedented levels of cooperation and coordination between the private and public sectors. Private sector participation in the program ranges from consultant support to full responsibility for designing, building, operating, and maintaining

IVHS systems. In addition, the private sector will develop and sell the many products and services that the IVHS program will spawn.

The IVHS program has been very successful in attracting the interest of the business community. For example, Hughes Aircraft Company is active in video imaging, satellite communications, and automatic vehicle identification; American Telephone and Telegraph is aggressively pursuing "smart card" technology for payment of tolls and transit fares; and Navigation Technologies and ETAK, two California firms, are in the forefront, both domestically and internationally, of in-vehicle electronic mapping.

Involving the private sector in a transportation program that has traditionally been managed through a partnership of Federal, State, and local agencies requires new models of cooperation. The Department has initiated several projects to stimulate public/private cooperation and to serve as examples of successful IVHS partnerships. Recent solicitations for IVHS operational tests have requested participation by small and disadvantaged businesses, including defense-related companies, and Historically Black Colleges and Universities, in order to form innovative partnerships for participation in operational tests. In addition, two of our IVHS Research Centers of Excellence, Texas A&M University and Virginia Polytechnic University, have Historically Black Colleges and Universities involved in their activities.

In this age of global competition, the public/private partnership that permeates our program is the key to success. Everyone wonders how our IVHS program compares with similar efforts in Japan and Europe, many of which began well before ours. IVHS AMERICA recently commissioned a study to find out, and the results are very encouraging. Unlike Europe and Japan, the U.S. program has placed considerable emphasis on organization, planning, evaluation, and a focused approach to developing a national IVHS

architecture, while simultaneously carrying out extensive research and operational field tests. All of these efforts have been advanced as true partnerships between the public and private sectors.

As a result of this strategy, as well as strong congressional support, the U.S. IVHS program rivals foreign programs in many aspects, and leads in some areas. For example, the study reports that we are well ahead in terms of organization and strategic planning, which is critical to the deployment of a nationally compatible system that will create large markets for American products. We are also ahead in technical areas such as electronic toll collection and commercial vehicle fleet management. In all, the study concluded that the United States has recognized the problems that must be solved, has planned effectively, is enjoying government funding and policy support, and -- through public/private partnerships is now making overall IVHS progress that compares very favorably with Europe and Japan.

Commercial Vehicle Operations

Secretary Peña has committed the Department to use advanced technologies to increase the safety and productivity of the motor carrier industry. Vital safety and regulatory checks would be made automatically, and electronically, eliminating delays to carriers. Truck and bus fleets would be able to purchase credentials electronically. This standard, nationally uniform credential data, along with safety, tax, and registration information, would be accessible nationwide so that compliant vehicles would not have to stop at inspection facilities.

To implement electronic clearance activities by 1997 will require consensus among various State agencies and the private sector. Consensus is the key ingredient because State and industry participation will improve communications and access to multiple State, Federal, and possibly private data bases.

From the start of the Commercial Vehicle Operations program, the FHWA has recognized the importance of consensus building among all of the involved parties. To obtain the broadest participation of both States and industry in the Commercial Vehicle Operations program, the FHWA has actively pursued input from them, as well as key organizations, from the earliest conceptual phases through deployment. These organizations not only give valuable input to the Commercial Vehicle Operations program, they form the bonds of a partnership between the FHWA, States, industry, and suppliers. These organizations include: the American Association of Motor Vehicle Administrators, the American Association of State Highway and Transportation Officials, the American Trucking Associations, the Commercial Vehicle Safety Alliance, the International Fuel Tax Agreement, the International Registration Plan, the National Governors' Association, the National Motor Carrier Advisory Committee, the National Private Truck Council, truck manufacturers, and owner-operators. We will continue to work closely with these organizations to foster the implementation of the Commercial Vehicle Operations program component of the National IVHS Program.

In accordance with section 6057 of the ISTEA, NHTSA conducted a study to evaluate electronic devices that alert truck drivers if a lane change or merge will put their vehicle in the path of another vehicle or object, or if there is a pedestrian in the vehicle's path when backing up. The report on this study was delivered to Congress in February 1994.

IVHS System Architecture

The Department is spearheading a program to develop an open national IVHS system architecture. This architecture will be a framework that describes how system components work together to achieve total system goals. It will describe the total system operation, what each component of the system will do, and what information will be exchanged among the

components. Because the IVHS architecture will be an "open" one, it will permit flexibility and innovation. Furthermore, the architecture will accommodate hardware and software products from multiple vendors, facilitating competition.

Four contractors -- Hughes, Loral, Rockwell, and Westinghouse -- have been selected to formulate possible architectures. The Department is making a strong effort to involve all major IVHS stakeholders, including the driving public, State and local governments, motor vehicle manufacturers, communications companies, and trucking companies, in the development process. The Department is providing stakeholders with opportunities to review developing alternatives, and is also disseminating information and requesting public comment throughout the development of the program. Given that surface transportation decisionmaking is inherently decentralized in nature, acceptance of the resulting architecture by a broad base of stakeholders will be necessary before any substantial implementation of IVHS technology can take place.

IVHS Standards

There is also a clear relationship between architecture definition and standards development, and the Department is closely coordinating these critical program elements. In fact, a specific position is being established in the new IVHS Joint Program Office to coordinate Departmental activities related to IVHS standards development.

An important result of the Architecture Development Program will be the identification of requirements for various standards to ensure national compatibility. As the program nears completion in 1996, progressively more concentrated, educated efforts will begin in these areas.

In the short term, before this more detailed information is available, the Department is engaged in several standards-related activities that are being undertaken alongside, and

with intimate knowledge of, the architecture development effort. For example, we have been working with IVHS AMERICA, its members, and others, to develop a Vehicle-to-Roadside Communications standard for electronic toll collection systems and other IVHS applications. This initiative is defining user requirements that will form the basis for a national standard. These user requirements will encourage and support the development of the next generation of technologies by the manufacturing community, and foster future national compatibility among these systems. This effort recognizes and accepts the existence of nonconforming systems already in operation by a number of toll authorities and other operating entities. An inevitable transition period is to be expected if these new requirements for future national compatibility are accepted.

The user requirements for vehicle-to-roadside communications are focusing on read-write capability, and the ability to connect the communications module to an onboard device, whether in a car, bus, or truck. The draft of these requirements was developed by representatives from California, Florida, New Jersey, New York, and Pennsylvania. In January, comments were sought from all State departments of transportation and toll agencies, and were incorporated into the draft document.

The second draft was distributed to the IVHS community for comment in April 1994. Comments from the vendor community and their efforts with the American Society of Testing and Materials are also being incorporated. A final draft of the user requirements will be prepared this summer and be submitted to a national standards-setting organization to be developed into a standard through the organization's consensus process.

Within the Automated Highway System program, nationwide compatibility is also a key goal that must be attained. This includes compatibility with the surrounding IVHS

architecture that will be in place at the time of deployment of an automated highway system, late in the next decade.

Both the architecture program and the surrounding and subsequent standards activity are in direct support of the Department's ISTEA-given charter to ensure nationwide compatibility of deployed IVHS systems.

Development of an Automated Highway System

The ISTEA requires the Department to develop an automated highway and vehicle system, and establishes a goal of having a demonstration system in place by 1997. Although full deployment of an automated highway system is certainly a long-term goal, pursuit of this goal is extremely important. By reducing human error, an automated highway could prove a nearly accident-free driving environment. In addition, a precise, automated vehicle-highway system could increase the efficiency of our highway facilities. An automated highway system may also encourage the use of more environmentally-friendly vehicle propulsion systems. This technology will initially provide partial control or control assistance to the driver, and will eventually lead to fully automated control on selected, high priority highways. Automated control of the steering, speed, and similar driving functions will provide a significantly enhanced level of safety, traffic flow efficiency and trip quality to the vehicle-highway system. Development of an automated highway system will also spawn innumerable commercial opportunities for U.S. electronic and communications firms, as well as many other large and small high-tech companies. The program will provide enormous opportunities for the American automobile industry to develop and market new products that will operate on an automated highway system.

Our current emphasis is on the identification and analysis of system alternatives, and the selection, documentation, and proof-of-feasibility of a preferred approach. Multiple

contracts have been awarded to analyze issues pertaining to technology application, design, deployment, operations, and practicality of an automated highway system.

The next phase of the program will be conducted by a National Consortium in partnership with the Department. Based on a competitive solicitation, we have received multiple applications from interested consortia and are currently conducting a process to evaluate and select the best consortium to lead this effort. We expect that the resulting cooperative agreement will be complete late this fiscal year.

IVHS and the National Highway System

The National Highway System will be the focus of future Federal investments for highway infrastructure. We believe that the deployment of IVHS technology needs to be a major part of that focus. That means implementing the technology that will provide such user services as advanced traffic control, dynamic electronic traveler information services, real-time route guidance, improved public transportation management, automated roadside commercial vehicle safety inspections, automatic "mayday" service, and electronic toll collection. We need to implement traffic management systems that have the capability to monitor traffic, detect problems and incidents, and provide the traveler with better information before and during trips. We need to build upon advanced systems like the one being implemented in Philadelphia that will provide an area-wide traffic and incident management program.

In conjunction with traffic management systems, we need to put in place other essential systems that will enable us better to access public transit services and ridesharing opportunities, and provide State agencies and commercial vehicle operators with automated monitoring and safety inspection of vehicles. These are just a few of the many possibilities

that we actually have to apply technology to the NHS. What is interesting about all of these systems that I mentioned, is that the technology is not just a vision, it exists now.

For example, electronic toll collection systems are already in operation in Oklahoma, Texas, Michigan, Pennsylvania, and New York, and are planned for California and Virginia. On the Oklahoma Turnpike alone, some 230,000 drivers use tags to pay tolls electronically, eliminating the need to stop at toll booths. The development of the national IVHS system architecture, and the ensuing standards development, will ensure compatibility of electronic toll collection systems throughout the country.

In the Smart Corridor along the Santa Monica Freeway in Los Angeles, data from control systems on both freeways and arterial streets are combined to produce useful, integrated information for travelers in the corridor. The success of this system is truly impressive. Prior to the January 1994 earthquake, the advanced traffic management system installed in the Smart Corridor reduced travel times by 18 percent, traffic signal delays by 44 percent, vehicle stops by 41 percent, emissions by 14 percent, and fuel consumption by 13 percent. Following the earthquake, the system provided traveler information to encourage transit and high-occupancy vehicle (HOV) usage, and facilitated the rerouting of traffic from the damaged Santa Monica freeway onto the arterial street system.

Advancing technology application on the NHS allows us to improve our capability for meeting the important goals of ISTEA, the Clean Air Act Amendments, and for society as a whole. The way to eventually achieve a National Transportation System is through intelligence on the NHS and on other modal facilities such as railways and ports.

The work of the I-95 Corridor Coalition, for example, is demonstrating how technology can be applied to the NHS. The I-95 Northeast Corridor involves the intermodal movement of both people and goods. It involves toll authorities and a whole host of

transportation modes, services, and facilities. An important aspect of the Coalition's work, and an important model for others, is that the projects that are being developed are integrated into the ongoing metropolitan and statewide planning processes of the jurisdictions involved.

The I-95 Northeast Corridor is one of four IVHS Priority Corridors, designated in March 1993 by the Department to help address air quality issues in four key regions of the country. The others include the Midwest Corridor through the cities of Milwaukee, Chicago, and Gary, Indiana, that is defined by Interstates 80, 90, and 94. The Houston Corridor runs through Houston and Harris County along Interstates 10 and 45. The Southern California Corridor runs through Los Angeles and Orange Counties to San Diego along Interstates 5 and 10, and includes the Smart Corridor I described earlier. It is important to note that all of these corridors are building their foundations upon coalitions and other forms of partnerships.

As they progress, all of these efforts will offer important models for deploying technology on the NHS based upon the environmental and transportation needs of the States and local areas, and the productivity and efficiency needs of the companies that depend on these corridors to do business.

On rural segments of the NHS, the deployment of IVHS technologies may take a different shape. Technologies could alert drivers to poor visibility caused by fog or snow, or provide emergency response to travelers in need of help in remote areas. Other rural technologies may provide route guidance or travel information to drivers in unfamiliar locales.

IVHS partnerships may be closely tied to commercial vehicle operations, as is the case with the Advantage I-75 project, where the Kentucky Transportation Cabinet is playing a lead role. Another example is the success of the HELP/Crescent operational test of

commercial vehicle services along the West Coast, which has led to the establishment of a new, innovative, not-for-profit company called HELP, Inc.

As these models for IVHS deployment on the NHS take shape, two important questions will undoubtedly be asked, especially by States and local agencies. The first question is, "Are these advanced technologies worth the investment?" We believe that the answer is definitely yes. Both the benefits and the costs are being identified, and we are committing significant resources to the operational test program and other activities that will assess the payoffs of IVHS deployment. This will provide important guidance to States and local agencies, as well as the private sector, as they make decisions on investing in IVHS.

While not all the benefits are visible at present, we have seen enough accomplishments resulting from the IVHS operational test program to be very encouraged. For example, the investment in the TravTek operational test of in-vehicle navigation in Orlando, Florida, spawned several innovative systems and products that are now being used by the City of Orlando and the State of Florida to better manage traffic and provide improved traveler information. In addition, General Motors, a major private sector contributor to the project, will soon be test marketing an in-vehicle navigation system in its new Oldsmobile Eighty-Eight LSS model.

As a result of research conducted under California's IVHS program, new collision warning systems have been developed and are being used on the entire fleet of Greyhound buses. We are learning from the SmarTraveler operational test in Boston that people appreciate the value of real-time travel information about incidents, construction, and transportation services. We also know from this project that the market for information grows as travelers experience the benefits that they can derive from it.

Over the next several years, we will show from these projects that there are real benefits from IVHS technologies. More importantly, we will show that the technologies are not solutions looking for problems. Our outreach, technology transfer, and technical assistance programs will help this happen.

The second question is, "Where's the money going to come from?" While the IVHS funds made available under ISTEA may carry the load for short-term planning, testing, and demonstration, sustained funding for IVHS deployment, as well as continued operations and maintenance, will need to come from multiple public and private sources. These will include existing Federal-aid funding sources for construction, traffic engineering, congestion management, air quality, planning, and research.

These types of projects will be the motivators for States and local areas to use Federal funds in the years to come. Given that fact, the deployment of an IVHS technological infrastructure will more likely occur if it can be linked to high priority projects pertaining to infrastructure improvements, traffic congestion mitigation, air quality improvements, and safety.

State and local agencies, as well as private industry, must also recognize that the Federal government is not the only resource for funds. We need to think of private as well as public sources of funding for applying technology to our transportation system. The risks are there for the private sector, but so are the rewards. We believe that the strong Federal investment in the NHS will be a signal to the private sector that there is a sustained market for a technological infrastructure and IVHS products and services over the long term.

One of the ways that we are promoting this is through the IVHS early deployment planning grant program authorized by the ISTEA. As part of their planning and design of transportation management projects using IVHS technologies, we are encouraging State and

local governments to establish partnerships with the private sector to provide needed IVHS products and services. Similarly, through seminars and meetings, we are working to raise the awareness of the private sector of opportunities for investment in IVHS. We are working on the resolution of institutional and legal issues that might impede private sector participation in the program. Simply put, we view the private sector as a crucial partner with the public sector in the development and deployment of IVHS technologies and systems.

We don't have all the answers to all the questions at this point in time. We continue to look, to listen, and to learn. If we wait for all the answers or for the best technology, nothing will get accomplished. We will learn more about the benefits only as we begin to apply the technology to meet our needs. Even small steps can make giant leaps in our knowledge. The NHS is the place to make those steps. Working with our partners, we will restore America's technological leadership and reinvigorate our economy.

Closing

At the outset of my testimony this morning I discussed the five goals established by Secretary Peña to guide the actions of the Department of Transportation. These goals -- to get the economy moving through strategic transportation investments; to make travel safer, more convenient, and more "human"; to ensure that transportation investments will assist our environmental efforts; to advance transportation technology and expertise; and to integrate all modes of transportation into a seamless intermodal system for moving goods and people -- will infuse all of our efforts to advance the use of IVHS technology.

Our transportation system is about more than concrete, asphalt, and steel. It's about people. America's economic future will depend on the nation's capacity to invent, master, and apply new technologies. It depends on moving ideas to the marketplace to spur growth, create new jobs, and strengthen our industrial performance.

The IVHS program presents an exciting opportunity for our country. Through the deployment of IVHS technology we have the chance to create a first-class surface transportation system for the twenty-first century -- a transportation system that will remain the best in the world.

Thank you for giving me the opportunity to appear before you today. I will now be glad to answer any questions you may have.

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TESTIMONY OF

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MINNESOTA DEPARTMENT OF TRANSPORTATION

BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

U.S. HOUSE OF REPRESENTATIVES
REGARDING
STATE DEPARTMENT OF TRANSPORTATION
IMPLEMENTATION OF INTELLIGENT VEHICLE HIGHWAY SYSTEMS

JULY 21, 1994

INTRODUCTION

Mr. Chairman, members of the committee, Minnesota has a strong tradition in Traffic Management. In 1972, we designed and constructed a Traffic Management Center in downtown Minneapolis and began gradually installing additional freeway management systems. In 1989, the Minnesota Department of Transportation (Mn/DOT) developed a 10-point plan to reduce congestion and promote highway safety in the Twin Cities Metro Area (TCMA). Under this plan we rapidly pursued new traffic management technologies and launched an aggressive expansion of freeway surveillance, ramp metering, motorist information, and incident management systems.

In 1991, we launched an Intelligent Vehicle Highway System (IVHS) program, called Guidestar, to further accelerate the introduction of new technologies. Guidestar stimulated partnerships with the private sector and local units of government which led to a number of operational tests.

As a result of the 10-point plan and the IVHS program, we have over the last five years built one of the largest and most comprehensive traffic management systems in North America. This system has already produced substantial road user benefits in the form of reduced congestion and accidents. We also have established a broad IVHS research and operational test program involving local governments, transit providers, academic institutions and private companies.

MINNESOTA'S IVHS PROGRAM

Minnesota Guidestar is dedicated to applying advanced technology to transportation systems throughout the State. Minnesota Guidestar seeks to create a truly statewide intelligent transportation system through a broad range of new technologies and multi-modal applications rather than focusing on the development and application of a single technology.

Guidestar has achieved cooperation between Mn/DOT, the State Patrol, transit authorities, fire and rescue companies, regional transportation agencies, city and county governments, the University of Minnesota and the private sector in conducting IVHS research and operational tests. (See Appendix A for a list of participants.)

The IVHS creates a vision for increased convenience, access and productivity for all transportation users in spite of continuously growing congestion and demand for services. These systems will eventually touch all geographic areas including urban communities, towns, and rural areas. Urban areas will remain vibrant and productive centers for business and commerce through the deployment of the latest traffic management techniques. Improved access to jobs will be attained through public transit, paratransit, land use, and design innovations. Rural Minnesota will witness great strides in long distance travel safety, increased tourism, and less isolation.

This vision will be achieved through vehicle and infrastructure safety enhancements, widespread information services, and wide deployment of communications technologies.

Minnesota Guidestar's vision of the future is one of a seamless, intelligent transportation system where, both geographically and modally, the public, travelers, and transporters of goods will perceive a unified transportation network without jurisdictional or institution boundaries. Travelers in the a metropolitan area will be presented with accurate, real time travel information, be directed to the optimum park-and-ride lots based on their destinations, told which bus to catch and precisely when the next bus will arrive, and pay for it with the same smart card that they used to pay their tolls and parking. In the case of an incident along the way, emergency services personnel closest to the scene will be alerted and directed to the scene. All of this will occur without the public perceiving that each of the modes and each of the services crosses separate jurisdictional and institutional boundaries. Achieving this vision requires unprecedented levels of coordination and management of many inter-related activities.

A separate office was created within Mn/DOT to plan, promote, coordinate, and deploy IVHS in Minnesota. A carefully defined committee structure provides a clear chain of command and lines of accountability. (See Appendix B.) The Guidestar's Executive Committee, composed of top public and private transportation leaders in the state, ensures the program remains focused on its goals and objectives, receives the needed resources, remains financially responsible, and aggressively pursues public/private partnerships. A Steering Committee provides information exchange, coordinates the management of many large independent projects, and develops strategic plans, budgets, and work plans.

Six technical working committees provide close project coordination among related projects. These committees are:

- Planning and Program Management
- Communication and Navigation
- Freeway and Arterial Management
- Research and Development
- Transit Innovations
- Rural Initiatives

The Guidestar Strategic Plan lays out the project goals and objectives for the next five to ten years, incorporating the 28 user services required by the FHWA. The Strategic Plan was developed with broad input from multiple levels of government and the private sector.

The 1995-1997 Guidestar Work Plan documents activities that will be undertaken over each twelve month period. It establishes benchmarks to measure progress and demonstrates how the Strategic Plan is translated into specific projects and activities.

Guidestar conducts $15 million per year of research, operational tests, and deployment which are funded by federal, local, and private sector dollars. Of this annual budget, 37.8% is allocated to operational tests, 30.8% to deployment activities, and 17.5% to research and development. The remaining 13.9% is designated for scoping studies, emerging technologies and administration.

Mn/DOT has 11 persons in the Guidestar office developing the program, managing research, and managing operational tests. In addition, other Mn/DOT offices also support IVHS initiatives with staff devoted to managing operational tests in the operations areas and staff that work with the University of Minnesota directing research.

As our program has matured, the scope and number of project initiatives have broadened. The current program consists of one or two major deployment projects for our Freeway Traffic Management System (FTMS) each year, twelve operational tests, nineteen research and development projects, four scoping studies, and three emerging projects. Each of these Guidestar programming areas makes an important contribution to a balanced IVHS program and will be described in more detail.

DEPLOYMENT

The foundation of the Minnesota Guidestar program is continued rapid deployment of FTMS in the Twin Cities Metro area. This system collects the information needed to operate freeways and to support other Guidestar initiatives. The FTMS communication system connects public agencies and academia to exchange this information and provides the basis for operational strategies of the future. The ramp metering and traveler information systems control and direct traffic to improve travel.

The Minneapolis/St. Paul metro area has over 300 miles of freeway. The FTMS functions include surveillance, management, motorist information, and motorist assistance. In 1988, the FTMS covered about 30 miles, consisted of 64 ramp meters, 31 closed circuit TVs (CCTV), and 9 changeable message signs (CMS). The system has been rapidly expanded over the last five years and now covers 167 miles and includes 358 ramp meters, 145 CCTVs, and 45 CMSs. (For more details, see Appendix C.) The goal is to have the entire metro area freeway system covered by the year 2000. The FTMS is the nucleus for traffic, roadway, and weather information, which is collected, fused, and disseminated in support of traveler information services and IVHS operational tests.

FTMS deployment has immediate, documented benefits. For a typical 15 mile freeway section these benefits are:

- Roadway capacity increases from 1800 to 2200 vehicles per lane per hour.
- Peak period speeds increase 35%.
- Peak period accidents decrease 27%.
- Peak period accident rates decrease 41%.
- Peak period fuel consumption decreases by one million gallons per year.

The FTMS includes an extensive fiber optic communication system which is the backbone of the FTMS. It connects St. Paul, Minneapolis and Hennepin County traffic centers and the State Patrol and Maintenance Dispatch centers to Mn/DOT's Traffic Management Center to share information and coordinate system operations.

OPERATIONAL TESTS

Operational tests bridge the gap between IVHS research and full-scale deployment of proven technologies. These tests are critical to fully evaluate the effectiveness of innovative IVHS technologies and to develop institutional arrangements under real-world conditions, prior to full scale deployment.

There are currently 12 operational tests funded under the Minnesota Guidestar program. Of these 12 tests, the U.S. DOT recently awarded the Minnesota Guidestar Program the five operational tests: Genesis, Travlink, Artic, Trilogy, and Lidar. Guidestar is also participating in three commercial vehicle operation (CVO) test projects; Multi-State One Stop Shopping, License Plate Reader, and CVO-Iowa. The operational tests within each of the IVHS focus areas are:

Advanced Traffic Management Systems (ATMS)
- Portable Traffic Management System
- Integrated Corridor Traffic Management
- St. Paul Incident Management
- Adaptive Urban Signal Control and Integration

Advanced Public Transportation Systems (APTS)
- Travlink
- Smart DARTS

Advanced Rural Transportation Systems
- Advanced Rural Transportation Information & Coordination

Advanced Traveler Information Systems (ATIS)
- Genesis
- Trilogy

Commercial Vehicle Operations (CVO)
- Multi-State One Stop Shopping
- License Plate Reading

Environmental
- Light Detection and Ranging

Three examples will help explain how IVHS operational tests are being conducted in Minnesota and how they will benefit the traveling public.

ADVANCED TRAFFIC MANAGEMENT SYSTEMS (ATMS)

IVHS must be deployed on all roads, not just freeways. The Integrated Corridor Traffic Management (ICTM) Project on I-494 in Bloomington is an example of IVHS technology being used to better coordinate management of both arterials and freeways. ICTM will manage traffic as a single coordinated facility in this corridor where currently multiple agencies each manage their own individual components.

Mn/DOT has responsibility for freeways and State trunk highways, while the counties and cities control signals on the arterial network. Independently developed signal strategies, while adequate for non-peak traffic, provide a level of service that is below optimum during congested peak travel conditions. While preprogramming for special event travel flows is possible, municipal governments do not have the personnel nor the funding available for the frequent updates required. In many cases, fixed time systems have not been adjusted in several years.

The impact of multiple, independent traffic control strategies is most evident at the jurisdictional boundaries where those strategies produce a break in signal coordination, which increases congestion and travel times. Local travellers often use the freeway network for short trips to avoid this delay. Even during accidents, commuters tend to use the congested freeway rather than alternate routes. Better managed parallel arterial systems will smooth traffic flow and will help remove short trips from the freeways.

Many freeway corridors in the Twin Cities Metro Area are experiencing similar traffic conditions. The ICTM operational test holds great potential for improving traffic efficiency in these congested freeway corridors. Anticipated benefits include:

- Reduced impacts and duration of incidents using coordinated incident management techniques.

- Increased motorist safety through congestion management.

- Maximized traffic movement throughout the corridor by better utilization of the existing freeway and arterial streets (i.e. more efficient use of the entire road network by encouraging short trips on local streets and regional trips on the freeway).

- Significantly reduced delays, travel times, fuel consumption, and emissions through improved signal coordination and green time usage provided by an adaptive signal control system.

- Increased driver awareness, better driver decisions, and reduced driver frustration due to more comprehensive motorist information concerning travel delays and available alternate routes.

The success of the ICTM project, will depend on the degree to which all affected agencies participate and benefit. There is a long history of cooperation among the participating governmental agencies, the motoring public and the private sector in the planning of transportation improvements for the I-494 corridor. This spirit of cooperation has continued with a commitment made to the ICTM concept by all the participating agencies. Representatives from each agency have been active throughout the project planning and are represented on the Management Team. Technical support will be provided by the Center for Transportation Studies at the University of Minnesota.

The ICTM project was the recipient of the Governor's 1994 "Partnership Minnesota" award. Candidate projects and programs were judged on how well partnerships: (1) improved the quality of service, (2) saved time and money, (3) made better use of limited federal, state and local resources, and (4) enhanced government productivity through synergistic activity and interdisciplinary problem solving.

ADVANCED RURAL TRANSPORTATION SYSTEM (ARTS)

Transportation systems in rural Minnesota provide the elderly and disabled with transportation for meeting personal and medical needs. An IVHS paratransit program, called ARTIC, enhances independence and quality of life for these individuals through enhanced mobility. This program expands the existing service areas, enhances the reservation system, and specially equips vehicles and personnel. For example, a disabled person calls a dispatch center to schedule a ride for a doctor appointment for a specific date and time. The trip is programmed into the system and the service is scheduled. A transit vehicle then picks up the individual and transports them to their destination.

Trip scheduling is automated to effectively handle fluctuation in trip requests. Transit vehicles are monitored and communication between the dispatch center and vehicle is maintained to better optimize trips. Artic will improve transit service, productivity, systems monitoring, and travel security to better serve the special transportation needs of these rural Minnesota citizens.

ADVANCED TRAVELER INFORMATION SYSTEM (ATIS)

An ATIS operational test is the Trilogy project. Trilogy demonstrates area-wide broadcast of highway information to "smart receivers" capable of filtering traffic information for motorists. The highway information is provided by the Traffic Management Center, which also distributes traffic information via changeable message signs, a highway advisory radio service, and an area cable TV traffic network. Information from the existing wide-spread FTMS public infrastructure allows for the quick and inexpensive implementation of ATIS operational tests such as Trilogy.

The first stage of Trilogy involved small scale pilot tests of area-wide broadcast of digital traffic information to in-vehicle receivers of three different types.

Project partners for these tests were the Minneapolis Public School System (radio station KBEM), the University of Minnesota Human Factors Research Laboratory and private partners Volvo, Ford and Inditka. KBEM played a vital role in these pilot projects. For the last three years, KBEM has provided live traffic reporting from the Traffic Management Center with 2-3 minute broadcasts every ten minutes on weekdays during a.m. and peak periods. Its technical staff provided the communication expertise for the Trilogy Pilot Project and KBEM's FM channel sideband was used to transmit the digital traffic information to the smart receivers.

The Human Factors Research Laboratory is assessing the safety, performance and user friendliness of the various smart receivers used in these pilot projects.

The Trilogy pilot tests encountered some legal obstacles. In March of 1993, the Office of the Minnesota Attorney General conducted an assessment of the legal issues involved in deploying the technology. It was found that a state statute prohibited television screens from being installed in vehicles at any point forward of the back of the driver's seat. None of the receivers in the Trilogy Pilot Projects are televisions. Still, there was concern about violating the intent of the statute. This concern was allayed by the legislature amending the statute to specifically allow video screens installed as part of IVHS applications. This amendment became effective on August 1, 1993.

Stage II of the Trilogy project will expand application of the technology to a broad range of public and private fleets to evaluate the benefits of widescale deployment. FHWA recently selected Trilogy Stage II operational test for federal participation.

The Trilogy Project demonstrates Mn/DOT's role of providing leadership for government, private sector and academia to work together in new and improved processes and approaches.

RESEARCH AND DEVELOPMENT

IVHS research in Minnesota also benefits from the partnership approach under the Guidestar umbrella. The IVHS Institute at the Center for Transportation Studies (CTS) is one of five institutes created by Congress in the Intermodal Surface Transportation Efficiency Act (ISTEA) Act of 1991, and is the only one emphasizing IVHS. Its purpose is to conduct a multi-disciplinary program of transportation research, technology transfer, and education. The Institute works closely with transportation agencies and businesses and University faculty from many disciplines including civil engineering, human factors, computer science, and public affairs. Another main activity involves the development and implementation of an IVHS laboratory. This laboratory will be closely linked to the Mn/DOT Traffic Management Center and will be used to test and evaluate new strategies and technologies prior to large scale implementation. It will also be used as a training ground for transportation students and professionals.

The Center for Transportation Studies (CTS) and the IVHS Institute provide key research for the Minnesota Guidestar program. Strong ties between the University and Mn/DOT exist through CTS participation on Guidestar committees, involvement in the operational tests, and Mn/DOT direction of various research projects. Mn/DOT helps support the CTS program by providing funds for individual research projects and providing $250,000 annually to match the $1 million per year the U.S. DOT has awarded the IVHS institute.

In addition, for fiscal years 1993 and 1994, up to twenty-five percent of Guidestar federal appropriations are available for research. The IVHS Institute is involved in nineteen separate research and development projects for Guidestar. The Institute is also active in a number of Minnesota Guidestar operational tests. The University's Human Factors Research laboratory, for instance, evaluates the impacts of IVHS technologies on people. This broad interaction between that the CTS and Mn/DOT assures rapid technology transfer.

Minnesota Guidestar's Research and Development Committee is one catalyst for such interaction. Major accomplishments include:

- Developing a multi-disciplinary program of transportation research, technology transfer, and education.
- Site selection and preliminary design of a laboratory for IVHS research, education, and training.

- Defining an "Institute Partners and Affiliates Program" to provide for private sector involvement in the Institute.
- Developing a strategic research plan approved by the Research and Special Projects Administration, U.S. Department of Transportation.
- Developing research plans for specific projects, including an evaluation of machine vision for controlling traffic in the I-394 corridor.
- Establishing an IVHS fellowship program and an IVHS undergraduate scholarship program.

Minnesota Guidestar and FHWA have committed $2.75 Million in federal fiscal year 1994 to fund 13 research projects in several areas including:

- Traveler decision making and information needs.
- Computer-based simulation and modeling.
- Human factors of transportation safety.
- Legal, institutional and consumer interest issues.

OTHER INITIATIVES

IVHS plays a key role in other Minnesota initiatives. Recently the Minnesota Legislature directed Mn/DOT and the Metropolitan Council to study congestion/road pricing options for implementation in Minnesota. Mn/DOT and the Metropolitan Council have requested federal funds to conduct this study through the Congestion Pricing Pilot Program.

The proposed study will build on two previous studies. The "Congestion/Road Pricing Study" done in association with Wilbur Smith Associates and K.T. Analytics was a feasibility study for using congestion/road pricing to fulfill various local and regional goals. "Congestion Pricing for the Twin Cities Metropolitan Area", done by Herbert Mohring of the University of Minnesota's Department of Economics, the Center for Transportation Studies, the Metropolitan Waste Control Commission, and the Metropolitan Council was a very detailed quantification of the revenue and traffic impacts from an application of "pure" congestion pricing in the Metropolitan Area through use of state-of-the-art IVHS technolgy. IVHS is critical technology for all road pricing strategies being considered.

MINNESOTA GUIDESTAR ACCOMPLISHMENTS:

Minnesota Guidestar has through its structure, policies, and practice encouraged broad participation in IVHS activities. Although difficult to achieve, this participation has paid off. Successes include:

- Coordinating twenty-four partnerships with agencies representing federal, state, regional, county and city government. Many of these agencies participate in Minnesota Guidestar's committee structure. They provide local and regional leadership, help make or support Minnesota Guidestar strategic policy decisions and assist in daily program management.

- Initiating 19 separate research and development projects with the University of Minnesota's Center for Transportation Studies IVHS Institute.

- Developing partnership agreements with 13 private companies. These partnerships involve everything from donating services and equipment, to leasing or sharing in purchasing them at greatly reduced costs to government.

OTHER MINNESOTA GUIDESTAR ACTIVITIES INCLUDE:

- Participating in the National IVHS System Architecture Study.

- Developing public education and communication plans.

- Completing four user-needs studies.

- Hosting the FHWA Region 5 IVHS Information Exchange Forum.

- Participating in National IVHS program planning efforts through IVHS America committee memberships, and other technology transfer activities.

- Participating in Enterprise, a multi-state consortium for collaborative research, development and deployment of IVHS technologies.

- Participating in HELP, a multi-state consortium for development and deployment of IVHS applications for interstate commercial vehicle applications.

- Developing and testing advanced sensor technologies including machine vision and a number of other wireless detection systems.

NEW DIRECTIONS OF MINNESOTA GUIDESTAR

- Launching new initiatives in FM sideband traffic broadcasts, environmental sensors, rural public transportation, tollroads and congestion pricing, and commercial vehicle operations.
- Continuing efforts to remove statutory barriers to public/private partnership agreements.
- Participating in the Automated Highway System Consortium.
- Creating a state-of-the-art laboratory where the public, private, and academic sectors can work together as partners on IVHS research, evaluation, education, and training.
- Forming a regional IVHS AMERICA chapter.
- Participating on one of four teams developing a national IVHS architecture.

PROJECT CHALLENGES

PARTNERSHIPS

IVHS projects involve extensive new contractual situations that have challenged the ingenuity and patience of all. Some of the public and private sector partnering challenges are:

- Copyright and intellectual property concerns.
- State audit requirements.
- Federal and state law, rules, regulations and requirements.
- Proprietary data and confidentiality requirements.
- Indemnification and liability concerns.
- Differences between public and private sector contracts.

Minnesota Guidestar advocates partnership between the public and private sectors. To encourage participation by the private sector, the Minnesota Legislature revised a State statute to allow Mn/DOT's Commissioner to "enter into agreements with other governmental or non-governmental entities for research and experimentation; for sharing facilities, equipment, staff, data, or other means of providing transportation-related services".

It also allows other cooperative programs that promote efficiencies in providing services or that further innovation in transportation.

Following passage of the partnership legislation, Minnesota Guidestar outlined the role for private sector partners in research programs and operational tests. It also defined opportunities for private sector involvement at each level in the Minnesota Guidestar organization. Finally, it identified the private sector responsibilities and powers as a private partner.

Much of Minnesota's success is due to partnerships with private sector companies who are interested in improving Minnesota's transportation systems. Collectively, these private sector partners will contribute over $5 million in cash, staff time, and equipment for projects scheduled between 1994 and 1997. Private sector companies also contribute to the direction of the Minnesota Guidestar program, through participation on various committees. A Private Sector Advisory Panel is being formed to function as a forum in which public and private groups can work together to generate ideas and learn more about each other's goals.

Each partnership agreement is different and is tailored to meet the individual needs of both the project and participating agencies. Our experience has been that a successful partnership requires that the parties jointly develop the agreement. Legal council on both sides are kept abreast of the agreement process and periodically review draft agreements to insure that laws, rules, and regulations are adhered to. Language has been incorporated in the partnership agreements to address liability and indemnification concerns, (but to date this language has not been tested). Special contract requirements need to be addressed up front (e.g. audit clauses required by the State of Minnesota) so that private sector companies know what they are getting into, and conflict and problems later on in the process are reduced.

Contract differences were experienced between the public and private sector, especially when working with defense contractors. Their identified costs cover the risks they are taking (e.g. research and development costs for prototype equipment). These costs also include profit, overhead, equipment purchased or rented, and profit on subcontractors work. State inexperience with these items contributes to the complexity of contract negotiations.

Developing a method for selecting private sector partners has also been challenging. It is difficult to ensure that everyone is provided an equal opportunity to participate. Our future preference will be to solicit private sector partners through a request for proposal process.

FINANCIAL

The IVHS operational tests are unprecedented projects, with no clear process and procedures to guide the project managers. The proposals are developed under very tight time frames without the luxury or constraints of the traditional preliminary design process.

Because these projects are not tightly defined, many unforeseen problems have surfaced requiring additional dollars and resulting in project delays. Flexibility with the dollars allocated, both state and federal, is essential to effectively manage these dynamic projects. Guidestar has set aside 10% of the Guidestar operational test program dollars to cover unforeseen costs. These expenditures are reviewed and recommended for approval by the Guidestar Planning and Programming Committee.

To speed consultant selection, Minnesota Guidestar has developed an IVHS support service task order contract with seventeen different consultant teams. A task order contract was established through a competitive process. IVHS project managers are able to select a consultant from the task order contract list to perform specific work tasks. A work order is developed and agreed upon by both parties. This process pre-establishes consultant credentials thus reducing the time required to select the consultant and contract for work.

INSTITUTIONAL

Local and regional units of government are key to the broad implementation and long term success of the IVHS program. Travelers must use local roads for part or all of their travel. However, multi-jurisdictional projects are complex and challenging because each agency has its own policies, procedures, priorities, and reason for participating. The accountability and responsibilities of each agency is also different. Participating agencies must be willing to change existing operational procedures and strategies, they must be flexible with resources, and they must be willing to share in the risk. Equipment and technologies purchased for the project have to be shared by the participating agencies. It is important that each agency remains committed and continues to actively participate over the life of the project.

Early involvement by participating agencies is key to interagency cooperation. This involvement begins with participation on committees where project ideas emerge and continues through project proposals, selection, and implementation.

Public acceptance plays a vital role in the success of IVHS initiatives. Guidestar has an extensive public relations program to educate and inform the public. Guidestar assesses customers needs through scoping studies and focus groups and uses the results to select research and operational tests and target education programs.

STAFFING

A substantial commitment of resources are needed to support and maintain the Freeway Traffic Management System and IVHS technologies. The Mn/DOT Traffic Management section currently has a staff of 65 and an annual budget of $3 million for design, operation, maintenance, research, development, and evaluation of IVHS systems.

Rapid growth in the deployment, as well as the size and number of research and operation test projects has support staff stretched to its limits just maintaining the existing system and current projects. Yet new projects continue to emerge. Additional federal funding flexibility is needed to allow agencies to fund additional staff or contract for service to operate and maintain these systems and manage additional IVHS projects.

FUNDING SOURCES

For the past five years we have been installing one or two large traffic management systems each year. These systems each cover 10 to 15 miles of freeway and cost about $4 million to $6 million. The two main funding sources for deploying these systems are conventional state and federal highway construction funds. Traffic Management Projects are selected by the Twin Cities Metropolitan Planning Organization in competition with other road construction and transit projects. Declared regional priorities of this process for transportation projects are: (1) preserve the existing system, (2) managing the system, and (3) system expansion. IVHS deployment projects are considered "managing the system".

In addition, the Guidestar program receives $8 million to $10 million per year. This funding is used for research and development projects, IVHS scoping studies, and operational tests. (See Appendix E).

The Minneapolis/St.Paul Metro area is considered a non-attainment area and is eligible to receive CMAQ funds through 1997. Some of these funds were recently allocated to fund five local and state traffic operations positions for two years.

NATIONAL/INTERNATIONAL COORDINATION

Awareness of National and International developments is critical for Minneosta to stay current on the rapidly developing technologies of IVHS. Mn/DOT is active at the national level by involvement with IVHS America, HELP, ENTERPRISE, and the U.S. DOT's System Architecture program.

IVHS AMERICA

The Intelligent Vehicle Highway Society of America (IVHS America) has been a valuable resource to us for exchange of information with other agencies and private sector companies. Mn/DOT, CTS, and other Guidestar participants are active members and participate in or chair several committees. Guidestar has sponsored a booth and given presentations at every annual meeting of IVHS America.

ENTERPRISE

ENTERPRISE is a consortium of FHWA, 7 States, Transport Canada, a Canadian province and a European Country. ENTERPRISE offers the opportunity to work in partnership with other states and countries to pool resources, avoid duplication of effort, and develop standards. ENTERPRISE provides a forum for collaborative research, development, and deployment ventures reflecting the interests of operating governmental entities.

The broad objectives of ENTERPRISE are:

- Support members' individual IVHS activities.
- Support multi-state and international project cooperation and information interchange.
- Provide test beds for emerging IVHS technologies.
- Identify common needs within the group and pursue appropriate IVHS projects.
- Facilitate the formation of public-private partnerships for program activities.

Early ENTERPRISE efforts of members were to develop individual IVHS strategic plans. ENTERPRISE also identified two areas of special interest. The first is the International Traveler Information Interchange Standard for dissemination of traveler information in a digital format. The second area is rural IVHS applications. ENTERPRISE projects range from fundamental research, through technology development, providing input to standardization, and deployment.

SYSTEM ARCHITECTURE

Mn/DOT is a member of one of the four teams developing alternatives for the National IVHS Architecture. This involvement provides an opportunity to influence the process and keep informed of the architecture development.

A well-defined IVHS architecture will accommodate different levels of implementation, different system designs, as well as provide latitude for integrating or upgrading existing systems in order to preserve current investments. This allows different goals to be supported across many regions, i.e. different user services will be important to rural and urban areas. It is critical that Mn/DOT be involved to guide our own work and make sure the national architecture reflects the needs and investments of states.

COMMERCIAL VEHICLE OPERATIONS

Mn/DOT is involved in two operational tests involving Commercial Vehicle Operations (CVO). One is a joint venture with the Wisconsin DOT testing license plate reader technology. This project combines two technologies: (1) Minnesota's License Plate Reader, and (2) Wisconsin's real time safety inspection data base. The goal is to increase safety by decreasing the number of "out-of-service" violations. The other operational test is a "One Stop Shopping" demonstration being conducted by the University of Iowa for the purchase of motor carrier credentials.

Also, Minnesota has been a member the Heavy Vehicle Electronic License Plate Program (HELP) for ten years. HELP was the first IVHS Program for commercial vehicle operations. HELP participants are from Canada and the States of California, Oregon, Washington, Arizona, New Mexico, Texas, Colorado, Idaho, and Utah. Initially focusing on hardware development HELP evolved into a pioneering effort between public and private sectors involving federal and state governments and the motor carrier industry, as well as Canadian interest at the federal and provincial level, to overcome institutional barriers and interstate trucking obstacles.

As the HELP Program evolved to the Crescent Demonstration Phase, the Policy Committee confirming the fundamental precept of HELP as a research initiative whose goals were:

- The evaluation of technologies to improve commercial operations in the highway environment.
- The identification of institutional barriers affecting the deployment of a HELP system.
- The definition of the applications and services to be provided by a HELP system.

It is through HELP that Mn/DOT obtained firsthand knowledge on establishing a regional integrated motor carrier management system, the first crucial step toward the realization of a national IVHS/CVO system.

SUMMARY

Minnesota has established a broad, aggressive IVHS program that spans from research to deployment. It encompasses state and local governments, academia and private companies. It includes highways, traveler information, transit, and commercial operations. It has broad financial commitment from both special federal funding and regular funding sources. It is strongly linked to national and international efforts.

Minnesota is treating IVHS as the inevitable transportation future and is rushing to meet it. Continued federal support and flexibility in the use of federal funds is essential to maintain the momentum, overcome the obstacles, and accelerate the learning. World leadership in space exploration was measured by the number of satellite orbits, size of satellites launched, a step on the moon, not by dollars spent on research, size of organizations, or number of tests conducted. World leadership in IVHS will be ultimately measured by the number of cities with systems, percent of the fleet instrumented, number of states connected, miles of highway automated, not by dollars spent on research, size of supporting organizations, or tests conducted. Minnesota's Guidestar program is aimed at deployment. We need continued federal support to help lead the way to world leadership.

APPENDIX A
Guidestar Partners

Public Sector

Federal Highway Administration
Mn/DOT
Counties
Cities
Metropolitan Council
Department of Public Safety
Pollution Control Agency
Regional Transit Board
Department of Public Service
Metropolitan Transit Commission

Private Sector

3M/Rennix
US West
Motorola
Westinghouse
Ford Motor Company
Volvo
Indikta Display Corporation
AWA Traffic System America
Traffic Control Corporation
Image Sensing Systems/Econolite
Castle Rock Consultants

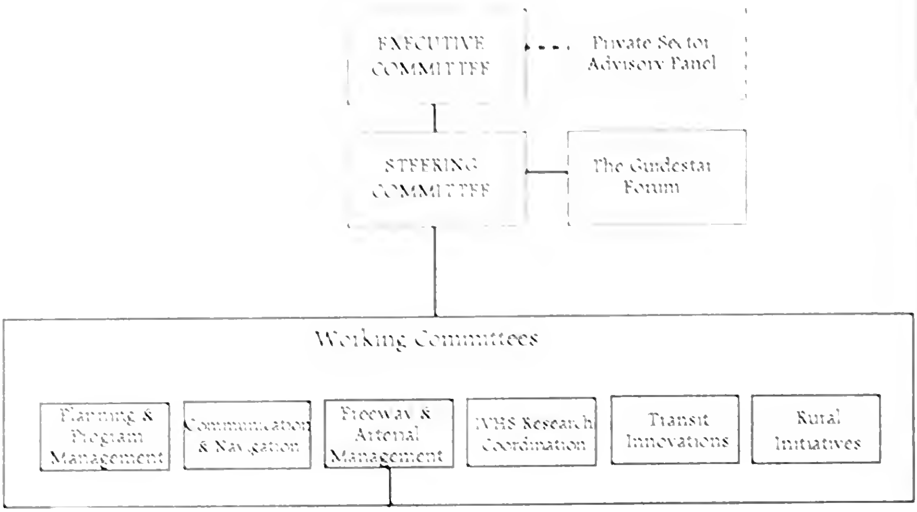
Academia

University of Minnesota
- Center for Transportation Studies
- Institute for Intelligent Vehicle Highway Systems

APPENDIX B

Project Administration

Minnesota Guidestar Organizational Structure



APPENDIX C

MINNESOTA DEPARTMENT OF TRANSPORTATION
FREEWAY OPERATIONS PROGRAM
Status Report - January 1994

CONTROL FACILITY: The Mn/DOT Traffic Management Center (TMC) is the operations center for managing freeway traffic in the Twin Cities Metro Area. The TMC was constructed and opened in 1972 as part of the I-35W Urban Corridor Demonstration Project. The TMC is located at 1101 4th Avenue South, Minneapolis, MN 55404, and the phone number is (612) 341-7500.

RAMP METERS: The TMC currently operates 353 ramp meters with 322 of them centrally controlled (on-line) by the TMC's mainframe computer and 31 isolated (stand-alone). An additional 40 ramp meters will be installed this year. By the end of 1998, a total of 490 ramp meters will be in operation, all on-line to the TMC.

CLOSED CIRCUIT TV: There are 142 CCTV cameras located along segments of the freeway system, and an additional 15 CCTV cameras are being installed this year. Plans call for a total of 180 cameras by the end of 1995. CCTV cameras along I-94 between the Minneapolis and St. Paul CBDs are mounted on top of tall buildings. Video signals from these cameras are transmitted to the TMC via microwave. Ninety-eight cameras are connected to the TMC with fiber optic cable and the others with coaxial cable. All cameras connected to the TMC with coaxial cable will be changed over to the fiber optic communications network within the next five years.

CONTROL ROOM REDESIGN: A redesign of the control room at the TMC was completed in late 1990 with additional changes made in December 1992. The new design includes two independent operator stations, a radio announcer station, an information officer work station, computer graphics terminals, and a large screen for map display. Each operator station has 24-17 inch monitors, and computer terminals with graphics capabilities to control on-line ramp meters and changeable message signs (CMSs). The Mn/DOT Traffic Radio broadcaster station currently has a bank of 128 nine-inch monitors. The information officers utilize a variety of audio communications equipment for additional monitoring of traffic and weather conditions. A large computer generated map displays real time traffic conditions on the Metro Area freeway system. With continued rapid deployment of traffic management systems, another redesign of the control room is underway.

CHANGEABLE MESSAGE SIGNS: There are currently 45 CMSs in operation and an additional 10 CMSs will be in operation by the end of 1995. Mn/DOT currently uses the six-sided rotating drum type sign, but recognizes the need for more flexible message capability, and is currently analyzing new technology for accomplishing this.

HIGH OCCUPANCY VEHICLE (HOV) FACILITIES: Mn/DOT currently operates 34 HOV ramp meter bypasses as an incentive for carpool, vanpool, and transit use in accessing the freeway system. Forty additional bypasses will be added by the end of 1995.

I-394, an HOV facility between the Cities of Wayzata and Minneapolis, opened in October 1992. I-394 is a six-lane radial freeway with 15 HOV only access ramps, three miles of reversible HOV lanes, and eight miles of concurrent (diamond) HOV lanes. Seven of the ramps provide direct access to the reversible HOV lanes between the Minneapolis CBD and TH 100. The other eight ramps are meter bypass ramps. During the AM peak period there are 84 inbound buses carrying over 2600 passengers. There are currently over 1600 vehicles using the HOV lanes during the A.M. peak hour, carrying between 43 and 47 percent of the inbound people.

Mn/DOT is providing other incentives to promote the use of I-394 HOV facilities. Three parking garages with direct access from I-394 are located on the fringe of the Minneapolis CBD. Registered carpools are able to park there for $15/month while others pay $85/month. There are 6000 spaces available in three garages, and over 2000 spaces are occupied by registered I-394 HOVs. Other incentives include seven remote Park-and-Ride lots and timed transfer stations for public transportation. There are 1021 spaces available at Park-and-Ride and time transfer stations, of which 664 or 65% are used on an average weekday. The I-394 HOV facility evaluation period began in 1992 and will be completed this fall.

TEAM TRANSIT: Team Transit is an interagency, cooperative effort to improve service to HOV and transit facility users. Team Transit projects are usually low cost enhancements to the existing transportation infrastructure. Project types include converting freeway shoulders to bus lanes, developing ramp meter bypasses, and permitting shoulder use to bypass queues at traffic signals.

"HIGHWAY HELPER" PROGRAM: The Highway Helper program was initiated in December 1987 to remove stalled vehicles from the roadway, assist stranded motorists and aid the State Patrol with incident management. Management of the program was transferred to the TMC in March 1993. Six heavy duty pickup trucks patrol 70 miles of the most congested freeway segments from 5 AM to 7:30 PM Monday through Friday. Since March the new group of Highway Helpers has averaged 1193 assists per month (199 per route). Approximately 43 vehicles are removed from traffic lanes each month. At this rate the program will assist over 14,300 motorists during the first year of operation under TMC management. The estimated annual benefit of the program due to reduction in congestion is $250,400 per route. The program cost is approximately $92,000 per route per year. A pilot project involving private tow truck operators led to a Metro wide freeway policy where tow truck operators are directed to an accident scene by the State Patrol dispatcher immediately, rather than waiting for a trooper to verify a tow is needed. The pilot project was successful, reducing response and removal time by 20 minutes. Funding for an AVL system was recently approved, and the system should be operational this fall.

MOTORIST INFORMATION PROGRAM: Mn/DOT is currently in the fifth year of a contract with the Minneapolis Public Schools (MPS) to provide a Traffic Radio service for the Twin Cities Metro Area. The MPS public radio station (KBEM, 88.5 FM) is used to provide live traffic reporting weekdays during peak traffic periods, broadcasting a two to three minute report every ten minutes. During major incidents, motorist information is broadcast continuously and drivers are alerted by signs and flashers to tune in to the Traffic Radio station for live reports. Twenty-seven Traffic Radio signs and all of the 45 CMSs can be individually activated from the TMC for this purpose.

A Cable TV Traffic Channel has been operational for 20 months, utilizing channel 42B on the Minneapolis Paragon Cable system. The broadcast includes a real-time graphics map showing traffic flow conditions on all of the currently instrumented freeways, videotext providing lane control information and other public service announcements, and live video from on-line CCTV cameras. The audio feed is supplied by KBEM, 88.5 FM, and during peak periods includes the Traffic Radio broadcasts. Wider circulation of this motorist aid is being pursued with other cable companies.

VIDEO IMAGE VEHICLE DETECTION: A system of 39 Autoscope cameras has been installed on a three mile section of the I-394 corridor to serve as a live laboratory for measuring volume, lane occupancy, speed, headway and vehicle classification utilizing video imaging technology. The primary purpose of the system is for testing and calibrating an automatic incident detection system and studying traffic flow characteristics. Mn/DOT is currently integrating the autoscope data into the existing loop detector system for purposes of calibration and use in ramp metering algorithms. Evaluation of this system should be completed later this year.

INTELLIGENT VEHICLE HIGHWAY SYSTEMS: The Research and Strategic Initiatives Division in Mn/DOT's Central Office manages Minnesota's IVHS program called "GuideStar". The TMC's principal involvement with IVHS technologies is with Advanced Traffic Management Systems and Advanced Traveler Information Systems.

Integrated Corridor Traffic Management is proposed for a 5.3 mile segment of the I-494 corridor. The project participants include all tiers of government, the private sector and academia. The goal of this project is to improve the efficiency of traffic movement throughout the corridor. This will be achieved by applying a combination of traffic management strategies developed through inter-jurisdictional cooperation and coordination. The project will include a comprehensive incident management and special events, public relations, and motorist information program. Other project components include implementing a corridor-wide adaptive traffic control system for both signalized streets and metered freeways, utilizing advanced technologies in the operation and evaluation of the system, providing motorists with real-time traffic information, and providing real-time traffic information at major traffic generators within the corridor. The FHWA has approved funding for the first phase of this project.

The Trilogy project will demonstrate a radio data system (RDS) for sending traffic messages. Mn/DOT is conducting three pilot tests utilizing the FM side band of Minneapolis Public School's radio station (KBEM, 88.5 FM). The pilot tests will demonstrate basic RDS features including sending traffic information to the motorist in various ways (graphically, synthesized voice, and text). The Human Factors Lab at the University of Minnesota will be conducting an evaluation of three prototype receivers. The objective of the Trilogy Project is to demonstrate the RDS-TMC technology, to evaluate the impact on motorist driving behavior, and to assess safety issues. Subsequent projects will test various other functionalities of RDS-TMC. Mn/DOT has formed partnerships for this demonstration project with Ford Motor Company, Indikta Display Systems, AB Volvo, and KBEM. The pilot projects will be operational this spring and run for one year.

The TMC will also be involved in two operational tests managed by MN GuideStar, Genesis and Travlink. Genesis will study the impact of using hand-held personal communications devices to deliver real-time traffic and transit information services. This spring, incident data from the TMC will be sent out to paging devices. By late 1994, a personal communications device providing trip planning, transit, traffic and parking information will be tested.

Travlink will test the impacts of various advanced traveler information and AVL systems on transit ridership and traveler behavior. Audio and videotext services will deliver real-time transit schedules and traffic information. This information will be available through kiosks at shopping malls and transit stations, and from terminals located at work locations and home. AVL technologies will be used as an input to real-time transit information services and as a fleet management tool.

SYSTEM BENEFITS: The following highway user benefits are from the I-35W project between downtown Minneapolis and Burnsville, and are typical of other large systems:

- Roadway capacity increased from 1800 to 2200 vehicles per hour per lane.
- Peak period speeds increased 35% from 34 to 46 mph.
- The number of peak period accidents decreased 27%, from 421 to 308 per year.
- Peak period accident rates decreased 41%, from 3.40 to 2.11 accidents per million vehicle miles traveled.
- Peak period fuel consumption was reduced by one million gallons per year.
- Peak period air pollutant emissions (carbon monoxide, hydrocarbons, and nitrogen oxides) were reduced by four million pounds per year.
- One million dollars a year in road user benefits are attributed to reduced accidents and congestion.

APPENDIX D
Operational Tests

Advanced Traveler Information Systems (ATIS)

Genesis tests the effectiveness of an advanced portable traveler information service to provide comprehensive, real-time travel data. Traveler information will be provided via fully portable, personal communications devices (PCDs). Initially, three types of devices are being evaluated: an alphanumeric pager, a notebook computer and a personal digital assistant. PCDs are being evaluated in a multi-phase operational test throughout the Minneapolis-St. Paul Metropolitan Area. The first phase is a pilot project which provides reports on incidents only. Later phases will examine the provision of additional information via PCDs.

Trilogy is a multi-phase project to develop and evaluate advanced traveler information service using the Radio Broadcast Data System - Traffic Message Channel (RBDS-TMC). Phase I focussed on integrating RBDS and existing traffic reports broadcast over KBEM-FM, Phase II on extending the system to include the broadcast of RBDS-TMC information throughout the Twin Cities. Three separate types of devices are currently being tested. Part of the project evaluation also calls for an examination of human factors including safety, end-user perspectives and design considerations.

Advanced Public Transportation System (APTS)

Travlink tests the impact of enhanced transit and highway information on commuters willingness to carpool, vanpool, or ride the bus. Eighty Metropolitan Transit Commission buses will be equipped with Automatic Vehicle Location (AVL) units. Transit operators receive data from AVL devices and use it to improve the efficiency of fleet operations. Transit users receive up-to-the-minute transit information based on AVL via videotext services at home, work or public locations. Information is accessible on videotext terminals, changeable message signs, display monitors and at kiosks. The operational test of this system will be conducted along the I-394 corridor.

SMART DARTS (Dakota Area Resources and Transportation for Seniors) demonstrates a combination of technologies to improve service of a local paratransit provider. Technologies tested include:

- Automatic scheduling and dispatching.
- Management Information Systems.
- Smart Cards.
- Automatic Vehicle Location Systems.
- Geographic Information Systems.

These technologies enhance responsiveness to riders and improve cost efficiency in providing service.

Advanced Rural Transportation System (ARTS)

ARTIC-Advanced Rural Transportation Information & Coordination will coordinate communication systems of transit agencies, State Patrol and Mn/DOT maintenance vehicles through a centralized dispatching location. ARTIC will improve transit service productivity, systems monitoring and public travel security through:

- Automatic Vehicle Location equipment and display terminals in emergency response, transit and volunteer driver vehicles.
- A centralized computer-assisted customer information and reservation service for regional transit providers.
- Alternative forms of communications with transit vehicles and volunteer drivers to determine the best system for emergency communications in areas normally beyond the range of conventional radio systems.
- Filling last-minute reservations or late-call trip requests through AVL, trip analysis software and communications devices such as pagers and cellular phones.

Advanced Traffic Management Systems (ATMS)

St. Paul Incident Management Project (SPIM) seeks to minimize incident-related congestion and secondary incidents in the I-94/I-35E commons area by making use of data/video communications between Mn/DOT's Traffic Management Center and the City of St. Paul. Traffic will be directed along designated incident-bypass routes with specially designed traffic signal coordination plans. Information will be available to travelers via static/changeable message signs. Surveillance cameras will be installed along the Interstate, at key intersections and along the bypass routes to provide real-time information to system operators.

Integrated Corridor Traffic Management Project (ICTM) demonstrates that more efficient corridor transportation movement can be achieved through:

- Cooperative jurisdictional efforts.
- Integration of freeway and arterial controls.
- Real-time adaptive control strategies.
- Advanced technologies.
- A comprehensive motorist information system.

Strategies are currently being developed to integrate freeway ramp metering and arterial street traffic control signal systems in the I-494 corridor. This project includes installing automatic data collection devices including vehicle detection and surveillance systems.

Adaptive Urban Signal Control and Integration (AUSCI) Project will focus on coordinating and integrating ramp meters and traffic signals along the I-394/Third Avenue Distributor in the western part of downtown Minneapolis. An optimization module is being added to existing traffic signal control software. Additional detectors are being installed to assist in real-time operations. By evaluating these strategies in a real-world environment, it will be possible to define and develop strategies for coordinated corridor-based traffic management.

Portable Traffic Management System (PTMS) will demonstrate and evaluate a fully portable traffic management system. PTMS is being tested in two locations at a total of six major special events. The PTMS consists of:

- Three video cameras and three changeable message signs.
- A highway advisory radio.
- One portable traffic signal.
- A fully portable traffic control center.

This project includes a detailed evaluation of PTMS impacts on traffic management.

Environmental

Light Detection and Ranging (LIDAR) project seeks to quantitatively and qualitatively determine the environmental impacts of IVHS. It does this by combining LIDAR with other emissions and vehicle sensing equipment to produce more readily understood computer imagery of air quality within IVHS project areas.

Emerging Concepts

Rosedale Project will attempt to reduce congestion in the immediate vicinity of a major activity/retail center by using advanced traffic management and traveler information technologies. Traffic sensing devices will be located at strategic points on the roadway network around the Rosedale Shopping Center. Data from these sensors will be relayed to an on-site traffic information center. Information about current traffic conditions, parking availability, weather information and transit schedules will be passed along to travelers via changeable message signs and touch screen kiosks at the Center.

Advanced Parking Information System will examine the feasibility of an automated, real-time parking information and guidance system. Information on parking space availability and routing instructions to alternate lots will be displayed on changeable message signs. It will also be distributed via broadcast and other media.

Odyssey seeks to test how advanced transportation technologies can be used to provide traveler information and emergency alert capabilities. Conceptually, Odyssey is viewed as a multi-phased project. In Phase I, tourist, weather, road construction, detour and other routing and trip planning information will be available to travelers at fixed locations. Later phases call for such information to be available via fully portable, interactive, on-person or in-vehicle devices. It's anticipated these devices will ultimately have the capability to broadcast "mayday" information to emergency service providers.

Scoping Studies

Rural IVHS Scoping Study identified through focus groups, regional meetings and a telephone survey the travel needs and concerns of rural Minnesota . Minnesota residents, tourists and the providers of transportation systems, products and services in rural parts of the state were surveyed. Study results are being used to determine which IVHS user services, technologies and products might be appropriate for a rural environment.

Integrated Traffic Management Systems (ITMS) Scoping Study will pilot integrated freeway and arterial traffic operations in the Minneapolis and St. Paul metropolitan area. The study is part of an effort to build cooperation for implementing the Twin Cities ITMS design and to develop preliminary engineering details -- including cost estimates and construction schedules for recommended options. The two primary focus areas include:
*Short-term, operational experience.
*Longer-term, strategic ITMS design.

ITMS Operations and Maintenance Program Study will prepare an inventory of ITMS program plans and schedules and review existing maintenance and operations practices. Alternatives that illustrate the potential for improved efficiency will be developed. These alternatives will be incorporated into a strategic plan to develop an operations and maintenance program for the Twin Cities ITMS.

IVHS/Commercial Vehicle Operations (CVO) Study identified institutional barriers to the adoption of electronic technology in transactions between commercial vehicle operators and state agencies. The study:

* Documented processes used by agencies to register, license, weigh, inspect and issue permits to commercial vehicles.
* Surveyed carriers about their capability and willingness to use technology in transactions with the state.

These insights will help develop an implementation plan for CVO technologies in Minnesota.

IVHS and the environment study examines the potential environmental impacts of IVHS on air quality, energy consumption and land use. Study sites include Minneapolis/St. Paul, Minnesota, Portland, Oregon and Houston, Texas. The final report will suggest models for cooperation between the transportation and environmental community. It will also contain policy recommendations regarding:

* Improving data collection.
* Improving public participation.
* Linking environmental goals to IVHS deployment.
* Enhancing the ability of metropolitan planning organizations to address IVHS/environmental issues.
* Clarifying the lines between IVHS operational tests and deployment.
* Use of congestion mitigation/air quality funds.

The State and Local Policy Program of the University of Minnesota's Hubert H. Humphrey Institute of Public Affairs is conducting the IVHS/environment study for the Federal Highway Administration.

APPENDIX E

Program component	Project	Costs to date	Project status	Cost Participation - FFY 1994: Federal IVHS	Federal non IVHS	Mn/DOT	CTS	IVHS Institute	Other Local	Private	1994 Total	Cost Participation - FFY 1995 - 1997: Federal IVHS	Federal non-IVHS	Mn/DOT	CTS	IVHS Institute	Other Local	Private	1995 - 97 Total	Project Total
Research and Development Projects	ATIS Research		N/A	95	0	29	0	44	0	0	168				REVENUE	BASED				168
	ATMS Research		N/A	572	0	187	0	176	0	0	935				ON MA	XIMUM				935
	AVCS Research		N/A	160	1750	240	0	35	128	572	2885				POTENTIAL	FUNDING				2885
	Human Factors		N/A	139	0	19	30	0	0	63	251			APPROX	IMATELY	$12.3 MILLION				251
	Other costs (ii)		N/A	1240	0	290	118	745	0	250	2643									2643
	R & D sub-total (iii)			2206	1750	765	148	1000	128	885	6882									6882
IVHS Scoping Studies	Rural Scoping		A	110	0	27	0	0	0	0	137									137
	ITMS Scoping		B	400	0	100	0	0	0	0	500	600	0	150	0	0	0	0	750	1250
	ITMS Ops & Main		B	30	0	15	0	0	5	0	50									50
	Studies sub-total			540	0	142	0	0	5	0	687	600	0	150	0	0	0	0	750	1437
Operational Tests	Genesis	571	C	3000	0	500	0	0	0	750	4250	3000	0	920	0	0	0	600	4520	9341
	Trilogy (iv)	290	N/A	0	0	100	0	0	0	105	205	2400	0	600	0	0	0	0	3000	3495
	Rosedale	20	E	80	0	4	0	0	5	1	90	189	0	38	0	0	67	145	439	549
	Adv. Park System		F	360	0	48	0	0	44	0	450	240	0	29	0	0	31	0	300	750
	Portable TMS	33	D	25	0	40	0	0	42	0	107	331	0	103	0	0	96	0	530	670
	St Paul IM		D	360	0	90	0	0	70	44	564	0	0	0	0	0	0	0	0	564
	ICTM		E	750	0	535	0	0	185	30	1500	3019	0	625	0	0	553	88	4285	5785
	Third Ave. Distrib.		E	547	0	10	0	0	854	99	1510	100	0	20	0	0	65	0	185	1695
	Trevlink (v)	150	C	2255	0	35	0	0	2717	630	5637	446	0	15	0	0	383	270	1114	6901
	Smart DARTS		E	65	0	7	0	0	62	3	137	207	0	13	0	0	182	23	425	562
	ARTIC		E	210	0	10	0	0	45	0	265	990	0	113	0	0	132	0	1235	1500
	Intelligent Wkzone		E	85	0	407	0	0	0	407	899	1531	0	532	0	0	0	532	2585	3494
	Odyssey (vi)		F	875	0	375	0	0	0	50	1300	970	0	380	0	0	0	350	1700	3000
	Op. test sub-total	1064		8812	0	2159	0	0	4024	2119	16914	13423	0	3388	0	0	1509	2008	20328	38306
Deployment Activities (vii)	Deployment sub total (viii)	7450		0	9680	2420	0	0	0	0	12100	0	10160	2540	0	0	0	0	12700	32250
Other (ix)				3935	0	875	0	0	0	0	4810	3411	0	895	0	0	0	0	4306	9116
PROGRAM TOTAL		8514		15293	11430	6361	148	1000	4157	3004	41393	17434	10160	6973	0	0	1509	2008	38084	87991

i - Research projects detailed in Figure 7.2
ii - Other research costs detailed in Figure 7.3
iii - Research and Development subtotal does not include potential funding for FFY 1995 - 1997
iv - Operational test underway but no federal funds requested to date
v - Federal 1994 IVHS total includes $400,000 grant from FTA
vi - Odyssey appears in program subject to availability of Mn/DOT funds
vii - Deployment costs detailed in Figure 7.5
viii - Costs indicated in costs to date column are for FFY 1993
ix - Other items detailed in Figure 7.4

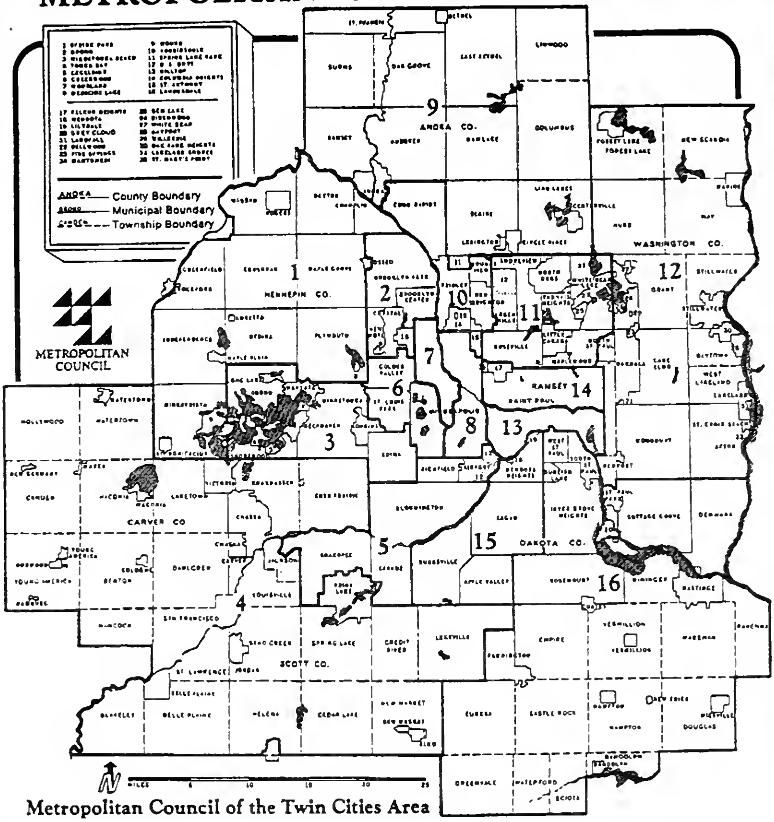
A - Approved Min. Guidestar study
B - Min. Guidestar study under consideration
C - Federal IVHS operational test
D - Approved Min. Guidestar operational test
E - Min Guidestar Operational test under consideration
F - Emerging initiative
N/A - Not applicable

Minnesota Guidestar provisional budget description for FFY 1994 and beyond

(NOTE ALL COST IN THOUSANDS)

August 1993

METROPOLITAN COUNCIL DISTRICTS



Metropolitan Council of the Twin Cities Area

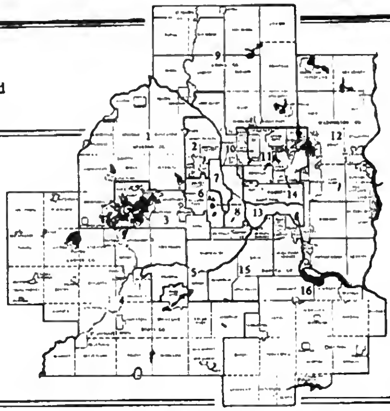
The Council members and their districts are as follows: Chair – Dottie Rietow

1 – Roger Scherer, Plymouth
2 – Bill Schreiber, Brooklyn Park
3 – Mary H. Smith, Wayzata
4 – Julius C. Smith, Chaska
5 – Sondra Simonson, Bloomington
6 – Martha M. Head, Minneapolis
7 – Barbara Butts Williams, Minneapolis
8 – Carol A. Kummer, Minneapolis
9 – David Hartley, Ramsey
10 – Patrick C. Leung, New Brighton
11 – Esther Newcome, White Bear Lake
12 – E. Craig Morris, Lakeland
13 – Diane Z. (DeDe) Wolfson, St. Paul
14 – Stephen B. Wellington, Jr., St. Paul
15 – Kevin Howe, Mendota Heights
16 – Terrence F. Flower, Hastings

Publication No. 310-93-020

Metropolitan Council

Advocating regional economic, societal and environmental issues and solutions



Dottie Rietow, Chair

Metropolitan Council
230 East Fifth Street
St. Paul, MN 55101-1634

291-6453 o, vm

Former director of Minnesota Office of Waste Management; interim chair of Metropolitan Waste Control Commission; Karen Gibbs Woman of Achievement Award, 1989.

h - Home; o - Office; vm - Voice Mail

District 1 (northwestern Hennepin County)

Roger Scherer

12001 Bass Lake Road
Plymouth, MN 55442

627-0810 o
557-9749 h

291-6482 vm

Owner of Scherer Brothers Lumber Co.; state representative, 1966-72; former member of Plymouth Planning Commission; former chair of Minneapolis Chamber of Commerce.

District 2 (Robbinsdale, Crystal, New Hope, Brooklyn Center, Brooklyn Park)

Bill Schreiber

10001 Zane Avenue N.
Brooklyn Park, MN 55443

296-3306 o
424-8081 h

291-6485 vm

Assistant to commissioner, Minnesota Dept. of Transportation; former owner of potato growing and packaging business in Brooklyn Park; state representative, 1973-76 and 1979-92.

District 3 (Edina, Hopkins, eastern Lake Minnetonka communities)

Mary H. Smith

515 N. Ferndale Road
Wayzata, MN 55391

475-1388 h
475-1048 fax

291-6488 vm

Former Wayzata School Board chair, 1987-89; former cochair of Minnesota Women's Political Caucus; former chair of Minnesota State Ethical Practices Board.

District 4 (Lakeville, Eden Prairie, Carver Co., most of Scott County)

Julius C. Smith

3200 Highpoint Drive
Chaska, MN 55318

831-1788 o
443-2430 h

291-6486 vm

Self-employed attorney; adjunct professor, Humphrey Institute of Public Affairs; past member, Twin Cities Metropolitan Planning Commission (predecessor to Metropolitan Council), 1958-67.

District 5 (Shakopee, Savage, Bloomington, Richfield)

Sondra Simonson

2815 Overlook Drive
Bloomington, MN 55431

884-7152 o
881-5975 h

291-6487 vm

Vice president of Simonson Realty, Inc.; past chair of Bloomington Chamber of Commerce; member of Metro Hospital Trustee Council; Bloomington Leadership Award, 1989.

District 6 (Golden Valley, St. Louis Park, southwestern Minneapolis)

Martha M. Head

1616 W. 22nd Street
Minneapolis, MN 55405

827-4006 o
577-4402 h

291-6509 vm

President of Myers Dairy Queen; vice president of Nationwide Housing Corp.; codeveloper and partner in Calhoun Square, a shopping mall in Minneapolis.

District 7 (downtown and north Minneapolis, portion of south Minneapolis)

Barbara Butts Williams
2222 Victory Memorial Parkway
Minneapolis, MN 55412
1-800-622-2025, ext. 267 (o)
588-1204 (h)
291-6395 vm

Executive with management consulting firm of Rath & Strong, Inc.; former vice president of sales, Wilson Learning Corp.; former marketing director, Control Data Business Advisors.

District 8 (eastern half of Minneapolis)

Carol A. Kummer
4818 30th Avenue S.
Minneapolis, MN 55417
296-4281 o
722-0370 h
291-6508 vm

Administrator of state House of Representatives Health and Human Services Committee; former member of Metropolitan Waste Control Commission.

District 9 (Anoka County except Coon Rapids)

David Hartley
14633 Bowers Drive NW.
Ramsey, MN 55303
241-9151 o
421-2778 h
291-6523 vm

Principal owner of Hartley Associates, consultants in technology management and computer network administration; former city administrator for Ramsey and Jackson, Minn.

District 10 (Coon Rapids, Fridley, Hilltop, Columbia Heights, St. Anthony, New Brighton, Mounds View)

Patrick C. Leung
1598 23rd Avenue NW.
New Brighton, MN 55112
636-4108 o
636-7408 h
291-6336 vm

Private law practice in Minneapolis; advisor to Organization of Chinese Americans; member of legal advice clinics and Asian American Legal Defense and Education Fund.

District 11 (several communities in northern Ramsey County)

Esther Newcome
2374 Joy Avenue
White Bear Lake, MN 55110
429-2714 h
291-6399 vm

Sales and marketing representative for Carlson Travel Network; member of St. Joseph's Hospital Auxiliary Committee; past president of White Bear Lake Historical Society.

District 12 (almost all Washington County, portions of N. St. Paul, Maplewood)

E. Craig Morris
150 South 5th Street, Suite 2968
Minneapolis, MN 55402
663-3166 o
291-6506 vm

Technical development manager for US WEST; mayor of Lakeland, 1986-91; member of legislative council on land use, energy, environment and transportation for League of Minnesota Cities.

District 13 (southern half of St. Paul)

Diane Z. (DeDe) Wolfson
1117 Goodrich Avenue
St. Paul, MN 55105
228-0338 o
221-0558 h
291-6326 vm

Legislative reporter for Minnesota Women's Consortium; state public affairs chair, National Council of Jewish Women; St. Paul Y.W.C.A. Leadership Award for Community Service, 1987.

District 14 (northern half St. Paul, Lauderdale, Falcon Heights)

Stephen B. Wellington, Jr.
2257 Gordon Avenue
St. Paul, MN 55108
292-9844 o
647-0362 h
291-6527 vm

Founder, Wellington Management, Inc., a real estate development firm; former deputy director for development, city of St. Paul; member, St. Anthony Park Business and Professional Association

District 15 (Mendota, Mendota Heights, Lilydale, Eagan, Burnsville, Apple Valley)

Kevin Howe
1763 Lansford Lane,
Mendota Heights, MN 55118
671-3142 o
454-6534 h
291-6524 vm

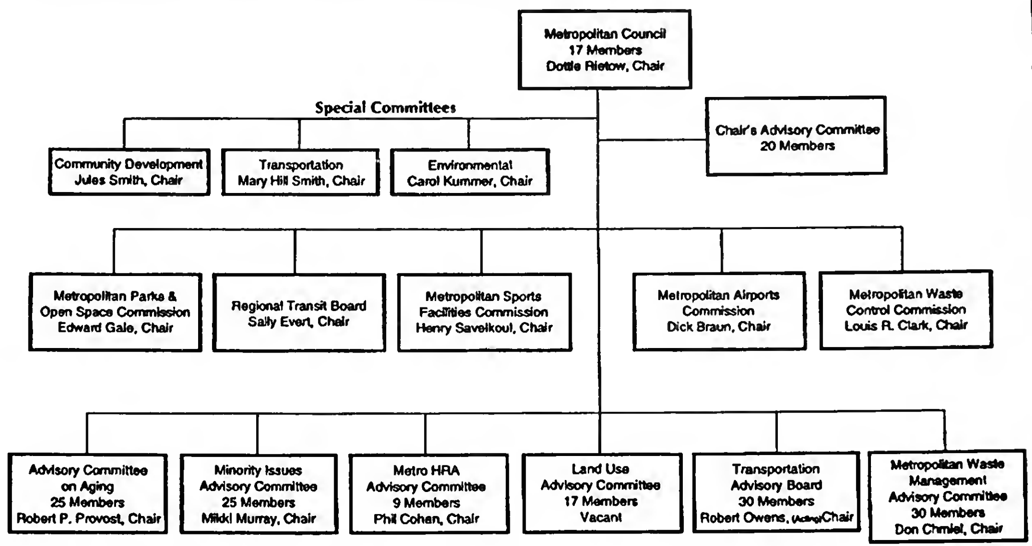
Vice president for government and client relations, IDS Financial Services; former assistant state attorney general; past president Minneapolis Jaycees; past director Minneapolis Rotary.

District 16 (south Washington County, and large portion of Dakota County)

Terry Flower
13875 Mississippi Trail
Hastings, MN 55033
690-6598 o
437-2005 h
291-6489 vm

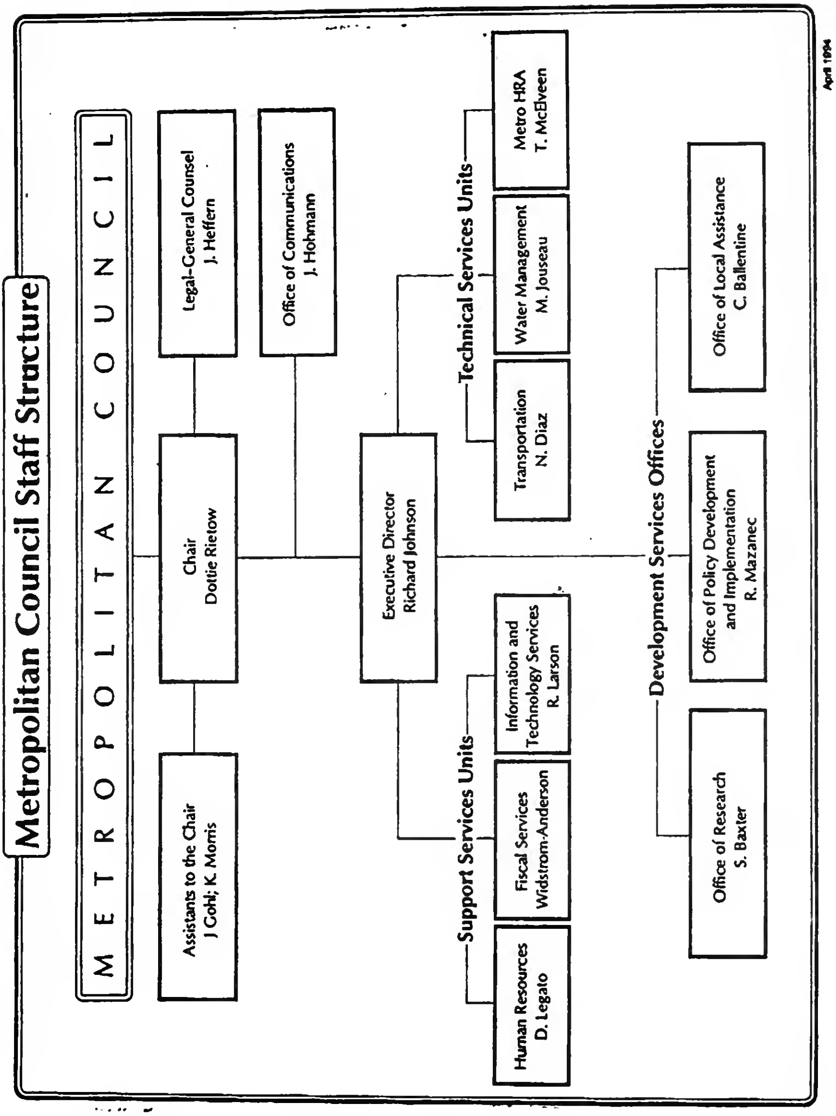
Physics department chair, College of St. Catherine; former Air Force pilot; former senior leader of Dakota County 4-H Federation; former Hastings school board member.

Metropolitan Council Policymaking Structure

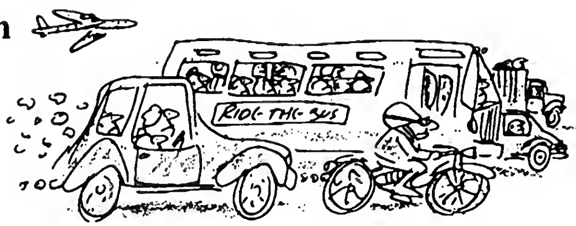


Metropolitan Council
Mears Park Centre
230 East Fifth Street
St. Paul, Minnesota 55101
612 291-6359 TDD 291-0904

April 1994


Metropolitan Council Staff Structure
METROPOLITAN COUNCIL
Assistants to the Chair
J Gohl; K. Morris
Chair
Dottie Rietow
Legal-General Counsel
J. Heffern
Office of Communications
J. Hohmann
Executive Director
Richard Johnson
Support Services Units
Human Resources
D. Legato
Fiscal Services
Widstrom-Anderson
Information and
Technology Services
R. Larson
Technical Services Units
Transportation
N. Diaz
Water Management
M. Jouseau
Metro HRA
T. McElveen
Development Services Offices
Office of Research
S. Baxter
Office of Policy Development
and Implementation
R. Mazanec
Office of Local Assistance
C. Ballentine
April 1994

Transportation Advisory Board



LET US INTRODUCE YOU

to the Transportation Advisory Board. Its job is to focus on transportation needs in the Twin Cities Metropolitan Area and assist in developing plans and programs to meet those needs.

The 30-member board consists of local elected officials, citizens and representatives of governmental agencies with transportation responsibilities. It was formed in 1974.

ITS PURPOSE

The board advises the Metropolitan Council on transportation matters involving the regional highway, public transit and airport systems. It helps the Council, Minnesota Department of Transportation, Regional Transit Board, counties and cities carry out transportation planning and programming for the region as designated in state and federal laws. It reviews and adopts the region's three-year transportation improvement program. And it develops priorities for transportation projects funded under the Federal Aid Urban and Interstate Substitution Programs.

The board was formed to ensure regional coordination and cooperative action among the many agencies and local governments responsible for planning significant transportation programs. It also provides a formal vehicle for citizen participation in regional transportation planning.

HOW THE METROPOLITAN COUNCIL FITS IN

The Metropolitan Council is responsible for both coordinating transportation planning and administering the transportation planning process in the Metropolitan Area. The Council prepares plans for the regional highway, public transit and airport systems, and evaluates and approves transportation projects based on those and other regional plans.

The Council is the chief planning and coordinating agency for the seven-county Metropolitan Area. It studies and makes recommendations to the state legislature on a broad range of regional matters, including parks, sewers, housing, health care and the environment, as well as transportation.

HOW MEMBERS ARE SELECTED

Of the 30 members, 17 are local elected officials, four represent government agencies involved in transportation, and eight are citizen members. The chair serves the region at large.

Seven county officials are appointed by the metropolitan counties. Ten city officials, reasonably representative of the region's population and geography, are appointed by the Association of Metropolitan Municipalities. The four agency representatives are selected by the Minnesota Department of Transportation, Regional Transit Board, Metropolitan Airports Commission and Minnesota Pollution Control Agency. The eight citizen members are appointed by the Metropolitan Council. Each represents two of the 16 Council districts. The board chair is appointed by the Metropolitan Council chair. Members serve two-year terms.

WHAT DO BOARD MEMBERS DO?

Members attend monthly meetings on the third Wednesday afternoon of the month. Each member also serves on one or more subcommittees, which meet as needed, but normally not more than once a month for one to two hours.

WHAT'S THE REWARD?

The reward for serving on the board is seeing your ideas translated into plans and programs that provide good highways, transit and air transportation for citizens of the Twin Cities Area. Incidental expenses are paid for members who are not full-time elected officials or agency representatives.

INTERESTED?

We encourage you to contact us so you can be considered for an appointment when vacancies occur on the board. For more information, please contact the Metropolitan Council, Mears Park Centre, 230 E. Fifth St., St. Paul, MN 55101. Or call 291-6390. The Council's telecommunications device for the deaf (TDD) number is 291-0904.

September 1990
Publication No. 310-90-133

Testimony Before
US House of Representatives
Committee on Public Works and Transportation
Subcommittee on Investigations and Oversight
on
Intelligent Vehicle-Highway Systems (IVHS)
July 21, 1994
by
Thomas Takashi Tanemori
3371 Moraga Boulevard
Lafayette, CA 94549
(510) 284-7910
(510) 284-7588 FAX

"Public Transportation Solutions as an Integral Part of
How the Visually Impaired Can Become More Productive in Society"

Transportation Solutions for the Visually Impaired

Mr. Chairman and members of the Committee, thank you for your invitation to present my thoughts on how the visually impaired can become more productive in society. As a blind person and a guide dog user, it is my earnest desire to return to the mainstream of society, not as a liability, but as a productive member of it; fully engaged in making contributions to the adopted nation to which I owe my life. I believe that your investigation of IVHS, should apply to the needs of the visually impaired in the public transit systems.

A Productive Member of Society

I am Thomas Takashi Tanemori, a survivor of the August 6, 1945 Hiroshima Atomic Bomb. I lost six members of my immediate family, including my parents. In 1956 fate forced me to seek a new life in America. I struggled for several years in a migrant labor camp in Delano, California. One day, after an extended illness, I was adopted by a caring American nurse and Japanese/American family. I was able to start a new life with hope and witness the rebirth of post-war America.

In time, I learned to become an American and acquired the formal education which I was denied in Japan because of my lack of social status. I have also learned what it is like being Japanese in America. On August 16, 1974 I became a proud naturalized American citizen with all the given privileges, rights, and responsibilities.

For the past twenty years, I have devoted my life to building bridges of understanding between Japan and the United States. I became an educator, lecturer, and inter-cultural consultant with US/Japan Business Development. I was even sent several times to Japan, my birthplace, as an emissary, working on behalf of the California Agricultural Department in the Pacific Rim Market countries - Philippines, Singapore, Hong Kong, and Japan.

I have also devoted my life to focusing on the special concerns of our senior citizens as part of the Silver/Gold Senior Ambassadors Project. It is my hope that their wealth of life experiences and wisdom can be used to form a *bridge* with our more youthful generation as peace educators and facilitators of community service.

In spite of the traumas of my youth, I have been able to grow into a responsible and productive citizen. However, it now seems that even that status is being taken away from me. For the last six years I have been moving toward complete and total blindness due to retinitis pigmentosa. My disability, however, stems from my physical blindness and from an unresponsive and labyrinthine bureaucracy. For me, floundering and stumbling through the streets and an inability to safely ride public transportation is dangerous and exasperating.

It was astounding for me to learn that there are 40 million Americans with disabilities[1]. More specifically, the productivity and quality of life of the over 3.3 million *severely visually impaired,* is significantly diminished. 600 to 900 thousand Americans are legally blind and another 100 thousand are totally blind[2]. It is projected that these numbers will increase by 400% over the next 20 years as the population ages. The Veterans Administration, for example, has approximately 90,000 legally blind patients and expects that number to increase to 130,000 by the year 2020. It is my understanding that California alone has over 800,000 people with mobility limitations[3] and Contra Costa County, where I live, has over 8,000 *severely visually impaired* residents[4].

How could I once again become a self-supporting, independent, and productive citizen? Mr. Chairman and members of the Committee, I would like to beseech your compassionate

---

[1] Americans with Disabilities Act (ADA) census July 1990.
[2] National Eye Institute.
[3] Disability Statistics Research and Training Center.
[4] Lions Blind Center of Diablo Valley, census 1990.

understanding and vision. I would like to show how I as an individual, along with 3 million others, could return to the mainstream of society as productive citizens.

It took eight long months of soul-searching agony — through denial, anger, and depression, until I finally reached acceptance of my vision loss. Then I began to realize that I could turn this misfortune into an opportunity. I began to gather data from my own experience of disability. I began to ask how I could mobilize myself and safely navigate, first with a white cane and later with a guide dog, through the streets of our nation, making full use of public transportation.

Specific Needs

I realized that I needed specific detailed information and feedback about my route, public conveyances, and possible obstructions not just for safety but to give me a degree of self-confidence and a sense of freedom. My goal is to accomplish the task of maneuvering as comfortably as *sighted* people do. My utmost hope to be less dependent on others for assistance and concentrate on becoming a productive member of society.

I have been able to identify four important transportation related needs of the visually impaired. These include:

- *Navigation*: Knowing where one is and how to get to where one needs to go — person wears a *smart* electronic device.

- *Transportation*: Quick, accurate identification of public transportation vehicles — same device placed on vehicles.

- *Collision Avoidance*: Detecting and avoiding physical obstacles, e.g., walls, curbs, partially open doors, posts, fire hydrants, and street signs — active device on person or in cane that *senses* environmental obstacles.

- *Emergency Summons*: For individual personal safety and confidence — cellular telephone technology linked with a "smart locator system" to transmit distress calls to emergency services.

Now, we have come to a threshold. Although I lack the technical and engineering capability myself, I truly believe that new technologies can and should be adopted and implemented to bring the transportation solutions of IVHS to a personal application and adapted for the visually impaired. Furthermore, I am confident that the following benefits can be achieved:

- Job creation
  - Ability to acquire and retain higher-paid jobs for the visually impaired
  - One billion dollars or more to industry for manufacturing navigation-aiding devices
- Reduce individual dependence on the social infrastructure
- Improved quality of life for the visually impaired
  - Enhanced mobility
  - Increased personal confidence
  - Reduced anxiety around safety and emergency related issues
- Synergism with existing high-tech transportation initiatives
  - Smart cars
  - Applications that require location information
    - Police, fire, emergency response, tourism, senior citizens

Request for Compassion

I would like to close by requesting your compassionate understanding of what the visually impaired face every day. It is my belief that Lawrence Livermore National Laboratory and their engineering technologies, expertise, and experience in integrating electronic systems can be used to develop and transfer this IVHS infrastructure knowledge, information, and technologies into the creation of a *smart* environment and an "environmental-information" guidance device for the visually impaired.

It is my understanding that the technologies required to develop these devices will benefit not only the visually impaired but that these same technologies can also be utilized for a variety of other applications such as emergency services and commercial delivery systems, which are a part of the IVHS infrastructure transportation system.

I am confident that people from LLNL with their technical resources could be instrumental in bringing new technologies to millions of citizens with disabilities, including senior citizens. To this end, I am ever grateful for your heartfelt consideration of the development of an "environmentally-smart" guidance device and the role all of you play in making it happen.

MEETING THE IVHS PROGRAM GOALS SET OUT IN ISTEA: A CALIFORNIA PERSPECTIVE

Mr. Chairman and Members of the Subcommittee, I am James van Loben Sels, Director of the California Department of Transportation (Caltrans). I appreciate the opportunity to testify today in regard to the direction and progress of the national Intelligent Vehicle-Highway Systems (IVHS) Program authorized under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. While I am formally representing Caltrans at today's hearing, I am sure that my views and comments are shared by many of our public and private IVHS partners throughout California.

California envisions a future where people, goods and information can move freely, securely and economically. The transportation system itself will be a balanced, integrated, multimodal network which is safe, equitable, environmentally sound and energy secure. In California, we see "smart" technologies as instrumental in helping us along the path to our mobility vision. Once researched, tested and deployed, technology applications such as advanced traveler information systems, automated vehicle control, and advanced traffic and intermodal transportation management systems can enhance the productivity of <u>all</u> transportation modes and enable new options for effective travel demand management (such as telecommuting). Smart technologies can link vehicles, operators, users and infrastructure together, making them particularly useful for integrating transportation system operations and promoting intermodalism. User access and convenience can be greatly enhanced by these technologies, as illustrated by the 28 user services outlined in the National IVHS Program Plan now in public review. Mobility equity, therefore, can be improved with IVHS approaches. Also, new technologies that might be costly in prototype or initial deployment phases generally become much more affordable in mass production as markets expand. For example, air bags and anti-lock brakes, available a few years ago only on top-of-the-line vehicles, are now standard fare in all price ranges.

As Chairman Mineta has pointed out, IVHS is probably a misnomer. Intelligent Transportation Systems are really what the national and California programs are focusing on, and where the real payoffs lie from application of these technologies. Some have expressed concern over IVHS program elements that focus on the automated highway system

(AHS), citing a scenario of even more overcrowded freeways, with concomitant increases in pollution and degradation of our communities. If this were the vision for IVHS, then certainly we would have the same concerns. However, we look at these technologies as building blocks that can be mixed and matched for a wide range of applications. We see these technologies, therefore, enabling a broad range of transportation policy and system options from which decision makers can choose, and actually expanding the opportunities for developing mutually supportive mobility/environmental packages. Reflective of this, and consistent with our mobility vision, one scenario we have developed and are pursuing with the help of the U.S. Department of Transportation (USDOT), is a personalized public transportation system that revolutionizes transit, providing door-to-door connectivity and speed and user accessibility that are truly competitive with the single occupant automobile. Under this scenario, the transportation system's people-carrying capacity would be increased without increases in vehicle miles traveled. Clean AHS propulsion technologies are elements of this scenario.

Another aspect of the building block approach to IVHS is that we can deploy useful products in the near term that form the elements of more advanced systems in the longer term. Citing an example from AHS, our early research work in California with VORAD, Inc. resulted in a collision warning product that is now deployed on all Greyhound buses, making their operation that much safer. It is anticipated that similar safety devices will be deployed on most new vehicles by the end of this decade. As another example, we expect the deployment of state and local advanced traffic management systems to be the precursor of intermodal transportation management systems which, in turn, will form the foundation for intelligent, integrated mobility systems.

The IVHS building blocks, therefore, are really very powerful and robust tools that can help leverage past and future capital investments in our transportation system. That is, with additional marginal investment, substantial productivity gains can be made with regard to the public infrastructure. To us, IVHS is an advanced form of Transportation Systems Management (TSM). Our experience with effective TSM programs is that they generate benefit-cost ratios of 10:1 and better. Of course, much research and testing remain to determine the most cost-effective ways of deploying IVHS product and service packages.

With these opening remarks on the California perspective on IVHS, I would now like to address the specific questions and issues raised by the Subcommittee:

Role of State DOT's & Research/Implementation Coordination

California has been a leader in this field, hosting the nation's first international conference on IVHS in 1986. Since that time, the State, along with federal, regional and local government, academia and private industry has built a working partnership for researching, testing and deploying advanced transportation systems, including IVHS, alternative clean fuels, and telecommunications (e.g., for tele-substitution). Under the sponsorship of Caltrans, the University of California' s Partners for Advanced Transit and Highways (PATH) Program is world renowned for its pioneer IVHS research. As with PATH, Caltrans is a charter member of IVHS America and sees its relationship with USDOT and the national IVHS Program as a true partnership.

We see state government needing to provide support for the national program through state administrative, legislative, regulatory and public policy initiatives which would promote joint public/private efforts or overcome institutional barriers at the state level. We see state DOT's taking a leadership position in keeping an emphasis on mobility, safety, environmental and other societal goals, and in ensuring adequate matching resources for federal funding opportunities. Also, as major transportation system owners and operators, state DOT's are responsible for the testing, evaluation and deployment of IVHS technologies on state transportation facilities and services.

In the California program, we make sure that transportation system planners and operators at the state, regional and local levels have input into, and are closely tied to, IVHS research, development and testing for the purpose of facilitating effective deployment. We have found the federally-supported IVHS field operational test and early deployment planning efforts extremely helpful in this regard.

California looks to the federal government to provide national leadership, development funding, regulatory support and national compatibility standards for IVHS. It also looks to USDOT to ensure that federal-aid funding is made available for IVHS deployment on a regular program basis.

Funding Levels

Federal funding levels are adequate for much of the currently identified IVHS research, testing and initial demonstration through 1997.

A few areas, however, will require more federal support. One is the AHS Prototype Demonstration. We feel that $20 million per year will be needed to support the development of such a prototype by 1997.

A second area that deserves special attention is rural application of IVHS. While many of the technologies being developed for urban application can also be deployed in rural environments, not all can without some modification. In addition, urban IVHS does not always address the special needs of rural areas. An example of this would be detection and warning of hazardous weather conditions. We have had some pretty horrendous traffic accidents on high-speed rural highways caused by poor visibility from dust, fog and the like. IVHS, particularly AHS collision-avoidance technologies, offer some real hope for a solution.

Another important item that needs to be addressed is regular, annual funding for each of the four Priority Corridor areas designated by Congress to showcase IVHS in the near term. In Southern California, much partnership activity and enthusiasm has been generated in the development of a Priority Corridor business plan and showcase program and in the initiation of a deployment planning process.

Most of the urbanized areas of Southern California are encompassed by this IVHS Priority Corridor (Appendix A). Over 15 million people currently live within its boundaries. The Priority Corridor has extensive intermodal characteristics, complex travel patterns and serious transportation and environmental problems that provide an excellent opportunity to showcase integrated, intelligent transportation systems. The Corridor is the gateway to the Pacific Rim and forms a land bridge to the Continental U.S. and Pacific Rim countries. The Corridor incorporates extensive High Occupancy Vehicle (HOV) and passenger/freight rail networks, many major air and sea ports, and an international border. This corridor also incorporates a world-class IVHS Test Bed, with full connectivity to our PATH university labs for high quality evaluations. The Southern California IVHS Priority Corridor partnership involves over 40 transportation operating and planning agencies, including air quality agencies, working closely with private industry and academia to address people, goods and information movement in the region. This partnership will oversee IVHS deployment planning and coordinate actual deployment in the region.

The near-term program developed by the partnership to showcase IVHS takes advantage of the region's characteristics and builds upon a substantial commitment to advanced traffic management and traveler information systems and commercial vehicle operations by both State and

local governments. This showcase program will enhance and link transportation management centers/systems throughout Southern California. Functions will include multimodal/environmental information collection and dissemination, traffic and incident management, fleet management (involving both transit services and commercial vehicle operations), air and sea port access and rail operations (Appendix B).

The showcase program will result in an intermodal transportation management and information system that can serve as the foundation for IVHS deployment in Southern California for many years to come. This program is also an excellent example of how IVHS can leverage larger capital investments. With this $44 million showcase, we will add enormous value to the several hundred million dollar investment in traffic management systems already being made in the region, not to mention the several billion dollar investments in basic transportation facilities and services. However, adequate federal support will be necessary to bring this effort to fruition. California is seeking $16.7 million for federal fiscal year 1994-95 to kick off the Southern California IVHS Priority Corridor showcase program.

Finally, additional funding should be generated for research, development and testing of Advanced Public Transportation Systems (APTS) - public transportation applications of IVHS.

Public Transportation Applications

As I mentioned, one of California's primary scenarios for IVHS involves public transportation. We have formed a partnership with the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) to pursue transit and paratransit (including ridesharing) applications of IVHS. Our California Advanced Public Transportation System (CAPTS) Program has a number of important research and field test/demonstration efforts underway:

- TRAVINFO - This is an advanced, multimodal traveler information system in the San Francisco Bay Area on which Mr. Larry Dahms has already provided information to you. This project, which Caltrans is co-funding, will have direct influence on national IVHS architecture.

- Los Angeles Smart Traveler - This project will demonstrate how real-time and other reliable types of information can be used by the public to examine high-occupancy vehicle travel options, including transit and ridesharing. Travelers can access freeway condition, transit itinerary

and rideshare information via touch-tone telephone, kiosks, and personal computer.

- Yosemite Area Rural Traveler Information System - This project combines transportation and electronic "yellow page" services in a rural setting, providing up-to-date information on transit, parking, accommodations and attractions in and around Yosemite. This, in turn, will help to reduce congestion and vehicle trips, and improve air quality while promoting tourism and economic growth. Partners include the National Park Service and several rural counties.

- Santa Clara Smart Paratransit - This project will develop and test a prototype, on-demand paratransit system in Santa Clara County that incorporates a digital geographic database, routing software and automatic vehicle location using the global positioning satellite network. The intent is to be able to handle the expected increased ridership as required under the Americans with Disabilities Act, providing more responsive service to the public and improving the routing and scheduling tasks of the providers. The result will be a model that can be replicated in other communities. The system has the added advantage of extendibility to multimodal applications, facilitating cost-efficient connections with already available bus, train and light rail systems.

- Light Rail System Safety Improvements Using IVHS Technologies - This project involves a case study of all accidents and near-misses since the opening of the Santa Clara County Transportation Agency's light rail system. The study team will first review and classify all system incidents, then investigate possible safety improvements, including both conventional and high-technology techniques to reduce the number and severity of collisions. It will define collision countermeasures, and prioritize a list of modifications based upon cost-effectiveness. This project will generate a set of practical collision-avoidance measures and help lay the groundwork for a more general collision-avoidance system.

These and other CAPTS Program efforts are only the first steps in realizing the vision of a public transportation system truly competitive with the automobile. They represent some of the elements in the development of our personalized public transportation scenario. Others include advanced fleet management, intermodal transportation system management and automated vehicle control applications, and, critically, the proper "packaging" of all of these into a coherent system. Much needs to be done here, and additional federal support is needed.

State and Local IVHS Planning

Through USDOT's support for IVHS early deployment planning and Priority Corridor planning, California has been able to involve many of its regional and local planning agencies in IVHS. These grant programs have been instrumental in introducing IVHS possibilities to transportation decision makers and enabled them to consider IVHS deployment in light of their regular transportation and air quality programs and plans. I strongly urge the continuation of these efforts and the expansion of IVHS early deployment planning grants to non-urban areas of the nation. After all, intelligent transportation systems address rural needs also.

Traffic Management Systems

As my comments on the Southern California Priority Corridor effort indicate, California looks to traffic management system deployments on both freeway and surface streets as critical building blocks for intermodal transportation management and IVHS in general. We would urge the federal government to continue to give these top priority for mainstream transportation funding.

IVHS Architecture/Standards

Caltrans is participating in the national IVHS architecture study, which has been described by others, and is collaborating in a number of architecture-related standards efforts. We think this is a critical undertaking that will provide the basic framework by 1996 for IVHS standards development and deployment in California and across the nation.

One concern is that considerable transportation and communication infrastructure has and will continue to be built ahead of IVHS standards being developed. This, of course, is only natural; we can't stop the world while we develop an architecture and standards. The system architecture, therefore, will need to be flexible enough to support interoperability among multiple, and heretofore, often incompatible vendor systems, both hardware and software. Funding of some tested-bed centers for interoperability should be considered to address current and evolving issues in this area. These could also address transportation applications of the National Information Infrastructure (information superhighway). How the national intelligent transportation system and information superhighway will interface must be explored.

Finally, the bandwidth needs for IVHS must be established and the Federal Communication Commission (FCC) must be encouraged to allocate the bandwidth for wireless applications. A communications subcommittee of IVHS America is exploring the issue of spectrum allocation for all IVHS applications. There has been considerable discussion on locating these in the 5.8 GHz band. This frequency would make the United States compatible with Europe, enlarging IVHS markets and making them more attractive.

Institutional Barriers/Issues

A number of institutional issues have been addressed by others, so I would like to focus on two specifically. The first is privacy. We take this very seriously. Some elements of IVHS have the potential to compromise privacy. However, we feel that privacy protection can be designed into these systems and that, in the case of public facilities and services, any tradeoff between privacy and function/convenience could and would be made only with an individual's full knowledge and consent. IVHS America has developed draft privacy protection guidelines which we expect to adopt as policies for conducting the California program.

Another issue is jurisdictional coordination. Always a complex challenge, in our experience IVHS has been a catalyst for enhancing cooperation among transportation agencies - state, regional and local; transit and highways. The multijurisdictional teams that we have developed throughout California for pursuing IVHS planning, field testing and corridor demonstrations will greatly facilitate IVHS deployment and should teach us some valuable lessons on how best to conduct transportation business under the ISTEA partnership mandates. These teaming arrangements will be evaluated as part of our overall IVHS assessments.

Commercial Vehicle Operations

Again, I would refer you to Mr. Dahms' testimony in this area, and add some information on HELP, Inc.

HELP, Inc. was created in October 1, 1993 to implement the technical elements of applications successfully demonstrated in the Crescent Demonstration. HELP is no longer a research effort; it is now an operational system. The first revenue-generation application is expected to be on line by October 1, 1994 with the Interstate 5 weigh station by-pass at Santa Nella, California.

HELP, Inc. is a public/private, not-for-profit corporation with its Board of Directors equally composed of state government and trucking industry representatives from each of the participating states. This type of organization was selected because there was no other available that could provide both coordination between states and representation from industry and government. HELP, Inc. has further created a franchise agreement for the initial operational development and daily operation of the HELP system.

Since there are limited federal funds available (and none dedicated) for this purpose, HELP implementation is being funded by a combination of state construction funds that can be made available and up-front funding from the HELP franchise agreement. The franchise will be reimbursed for implementation and operating costs as the system begins to generate revenues. Revenues will be collected from any party that decides to use the HELP, Inc. services. For example, each truck which will bypass the weigh stations will be charged a nominal fee for that opportunity. All HELP services can be viewed as value-added services, thus letting the marketplace determine the viability of the system. We will be looking closely at this as HELP, Inc. could become a model for delivery of other IVHS services.

Electronic Toll Collection

California has established a compatibility specification for electronic toll collection. The specification was adopted in July 1992 as a California regulation and requires that all California toll collection agencies adhere to that specification.

California participated in a national users group to develop a draft specification which would be a positive step toward a national automatic vehicle identification (AVI) specification. The draft specification was released for public comment in April 1994. The specification is very close to what California requires.

Many others are also are also working on AVI standards. The various standards efforts need to be pulled together into one national standard.

Defense Conversion Aspects

California, with its vast aerospace and defense-related industrial base, is facing critical defense conversion challenges. We see IVHS and other advanced transportation systems as a prime opportunity for establishing

new international markets for these industries as well as bringing powerful resources from these industries to address our mobility problems and issues. We would urge that more consideration be given to transportation and IVHS in current and future Technology Reinvestment Project solicitations.

SOUTHERN CALIFORNIA PRIORITY CORRIDOR

STATE OF CALIFORNIA

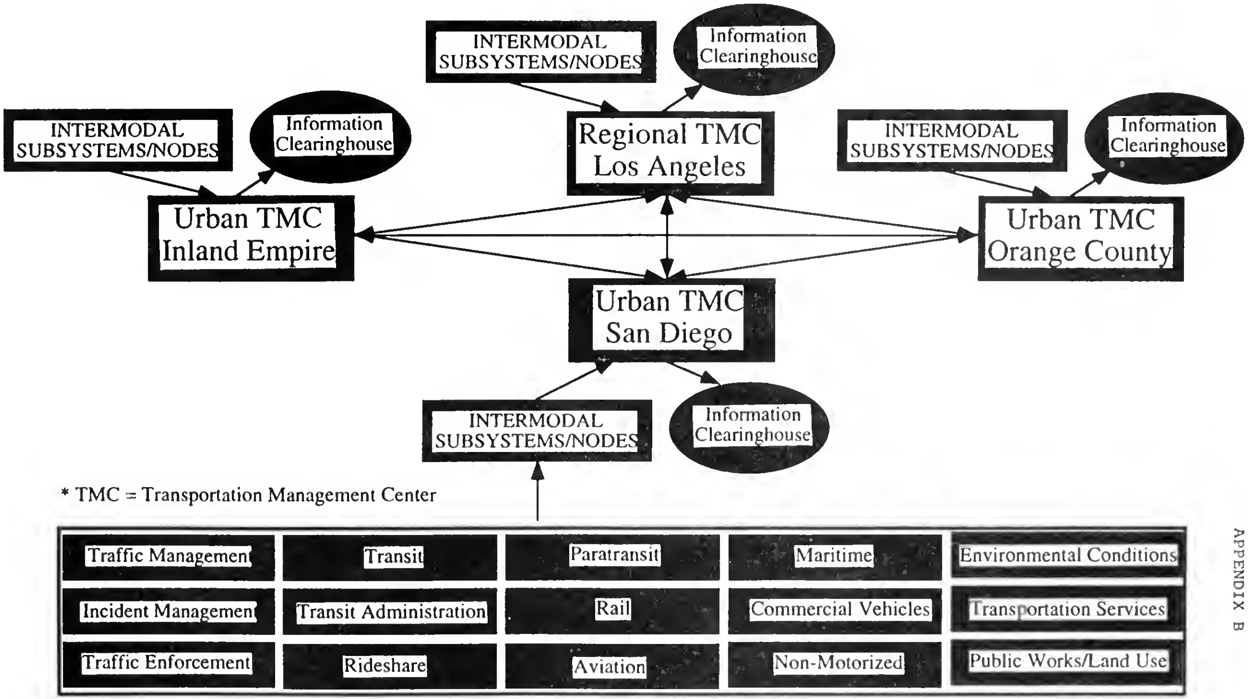
DEPARTMENT OF TRANSPORTATION

PREPARED BY
DIVISION OF NEW TECHNOLOGY,
MATERIALS & RESEARCH

Vicinity Map

SOUTHERN CALIFORNIA PRIORITY CORRIDOR

INTERMODAL TRANSPORTATION MANAGEMENT & INFORMATION SYSTEM (ITMIS)



* TMC = Transportation Management Center

MPOs and Weighted Voting

Seth B. Benjamin
John Kincaid
and
Bruce D. McDowell

The *Intermodal Surface Transportation Efficiency Act of 1991* (ISTEA) authorizes Metropolitan Planning Organizations (MPOs) to allocate about 20 percent of ISTEA funds to be spent in their areas. This new role for MPOs makes it important to assure fair representation of area local governments on their policymaking boards.

In 1993, the Federal Highway Administration (FHWA) surveyed the 137 MPOs that are designated as Transportation Management Areas. These include all MPOs serving a population of 200,000 or more, plus a few others with congestion and/or air quality problems. The information was collected by FHWA's district offices. They received responses from 86 MPOs.

ACIR analyzed the 86 responses and found the following:

- Central city residents are underrepresented on 68 MPO policymaking boards (79 percent) and overrepresented on 6 boards (data for the other 12 MPOs were incomplete).
- Population-weighted voting can be used in 18 MPOs in ten states and the District of Columbia. The states are Arizona, California, Colorado, Delaware, Michigan, Missouri, North Carolina, Ohio, Tennessee, and Washington. Only in the Metropolitan Washington Council of Governments is the central city representation almost equivalent to its percentage of the region's population. The central cities are underrepresented on the boards of 11 MPOs that can use weighted voting (data for the other 6 MPOs were incomplete).

Table 1 is a summary, by state, of the number of MPOs in which central cities are underrepresented and that are authorized to use weighted voting.

Weighted voting on MPO boards can be established by the MPO bylaws or by the state legislature. Table 2 shows which MPOs have weighted voting available to them.

Table 3 ranks central city representation on MPOs by an index of voting power and also shows the percentage difference between a city's board representation and its proportion of the region's population.

Table 4 expands the detail, showing central city population as a percentage of the MPO area population, and central city representation as a percentage of the total number of votes on the board.

Index of Central City Voting Power

ACIR created an index of central city voting power, which is the proportion of central city membership on the MPO board divided by its proportion of the population of the MPO area. The index allows a comparison of different size cities and MPOs in relation to each other.

An index of 1.00 means that a city has the same voting strength on the MPO as its proportion of population in the MPO area would warrant if one assumes one person-one vote. An index above 1.00 indicates overrepresentation of the city on the MPO board, and an index below 1.00 indicates underrepresentation.

Table [illegible]

Central City Representation on MPO Boards

(in Order of Index of Voting Power)

State	MPO	Index of Central City Voting Power[1]	Difference between Membership and Population Percentage	Weighted Voting Available
CT	Middletown	2.25	20%	No
UT	Salt Lake	2.20	24	No
FL	Tampa	1.88	14	No
FL	Saint Petersburg	1.29	4	No
FL	Fort Lauderdale	1.08	1	No
DC	Washington	1.06	1	Yes
NJ	Newark	1.00	0	No
Equal Representation		1.00	0	
PA	Harrisburg	0.83	-3	No
AL	Birmingham	0.79	-9	No
KY	Lexington	0.76	-24	No
CA	Los Angeles	0.68	-10	No
NV	Las Vegas	0.68	-12	No
OH	Canton	0.68	-11	No
FL	West Palm Beach	0.67	-3	No
WA	Seattle	0.67	-10	Yes
NV	Reno	0.63	-23	No
DE	Wilmington	0.61	-7	Yes
PA	Pittsburgh	0.59	-9	No
TX	Dallas	0.58	-13	No
CT	Hartford	0.54	-12	No
OH	Youngstown	0.54	-12	Yes
OH	Cleveland	0.53	-14	Yes
FL	Jacksonville	0.52	-41	No
WA	Vancouver	0.50	-14	No
VA	Richmond	0.47	-18	No
TN	Knoxville	0.46	-29	No
CA	Sacramento	0.44	-19	No
PA	Scranton	0.43	-12	No
CO	Colorado Springs	0.41	-47	Yes
MO	Saint Louis	0.40	-15	No
FL	Miami	0.37	-12	No
WA	Spokane	0.34	-42	No
GA	Atlanta	0.33	-12	No
MD	Baltimore	0.33	-26	No
MN	Minneapolis	0.33	-12	No
RI	Providence	0.33	-14	No
CA	San Francisco	0.30	-14	No
VA	Norfolk	0.30	-14	No
TX	El Paso	0.29	-65	No
NM	Albuquerque	0.26	-57	No
CA	Stockton	0.25	-60	No
MI	Detroit	0.25	-21	No
TX	Houston	0.25	-42	No
CT	New Haven	0.24	-22	No
MI	Grand Rapids	0.23	-33	Yes
CT	Bridgeport	0.21	-27	No
OH	Columbus	0.21	-53	No
TN	Memphis	0.21	-63	No
AK	Anchorage	0.20	-80	No
NY	Syracuse	0.19	-34	No
CO	Denver	0.16	-26	Yes
NY	New York	0.16	-56	No
CA	Bakersfield	0.14	-50	No
PA	Philadelphia	0.13	-42	No
TN	Nashville	0.13	-73	Yes
KY	Louisville	0.12	-36	No
CA	San Diego	0.11	-42	Yes
IL	Chicago	0.11	-39	No
IN	Indianapolis	0.11	-71	No
MI	Lansing	0.10	-43	No
WI	Milwaukee	0.10	-46	No
MI	Flint	0.09	-39	No
AZ	Phoenix	0.08	-45	Yes
CA	Fresno	0.08	-72	Yes
OH	Akron	0.07	-39	No
LA	New Orleans	0.00	-48	No
MA	Boston	0.00	-21	No
MA	Springfield	0.00	-34	No
MA	Worcester	0.00	-54	No
CA	Modesto	na	na	No
IN	Gary	na	na	No
IN	South Bend	na	na	No
LA	Baton Rouge	na	na	No
MO	Kansas City	na	na	Yes
NC	Charlotte	na	na	Yes
NC	Durham	na	na	Yes
NC	Raleigh	na	na	Yes
NY	Albany	na	na	No
NY	Buffalo	na	na	No
OH	Cincinnati	na	na	No
OH	Dayton	na	na	Yes
OH	Toledo	na	na	Yes
OR	Portland	na	na	No
PA	Allentown	na	na	No
PR	San Juan	na	na	No
UT	Provo	na	na	No

na—not available

[1] Voting Index—Percentage representation of central city on MPO board divided by percentage of central city population in MPO area.

Source: ACIR calculations based on U.S. Department of Transportation, Federal Highway Administration, 1993 Survey of MPOs.

Table 4 (cont.)

Central City Membership of MPO Board

(In Order of Index of Voting Power)

		Central City Voting Membership	Total Voting Membership	Central City Percentage of Total Voting Membership	Percentage of MPO Population in Central City	Difference between Membership and Population Percentage	Index of Central City Voting Power
CT	Bridgeport	1	14	7	34	-27	0.21
OH	Columbus	9	66	14	67	-53	0.21
TN	Memphis	1	6	17	80	-63	0.21
AK	Anchorage	1	5	20	100	-80	0.20
NY	Syracuse	1	13	8	42	-34	0.19
CO	Denver	2	42	5	31	-26	0.16
NY	New York	1	9	11	67	-56	0.16
CA	Bakersfield	1	13	8	58	-50	0.14
PA	Philadelphia	1	18	6	48	-42	0.13
TN	Nashville	2	19	11	84	-73	0.13
KY	Louisville	1	19	5	41	-36	0.12
CA	San Diego	1	19	5	47	-42	0.11
IL	Chicago	1	19	5	44	-39	0.11
IN	Indianapolis	2	22	9	80	-71	0.11
MI	Lansing	1	19	5	48	-43	0.10
WI	Milwaukee	1	21	5	51	-46	0.10
MI	Flint	2	48	4	43	-39	0.09
AZ	Phoenix	1	28	4	49	-45	0.08
CA	Fresno	1	16	6	78	-72	0.08
OH	Akron	1	38	3	42	-39	0.07
LA	New Orleans	0	21	0	48	-48	0.00
MA	Boston	0	6	0	21	-21	0.00
MA	Springfield	0	4	0	34	-34	0.00
MA	Worcester	0	4	0	54	-54	0.00
CA	Modesto	na	16	na	71	na	na
IN	Gary	na	na	na	24	na	na
IN	South Bend	na	na	na	49	na	na
LA	Baton Rouge	na	na	na	60	na	na
MO	Kansas City	na	12	na	55	na	na
NC	Charlotte	9	na	na	87	na	na
NC	Durham	2	na	na	67	na	na
NC	Raleigh	na	na	na	18	na	na
NY	Albany	na	22	na	20	na	na
NY	Buffalo	na	8	na	34	na	na
OH	Cincinnati	na	na	na	37	na	na
OH	Dayton	6	na	na	30	na	na
OH	Toledo	na	37	na	71	na	na
OR	Portland	na	13	na	44	na	na
PA	Allentown	na	na	na	27	na	na
PR	San Juan	na	na	na	na	na	na
UT	Provo	na	na	na	39	na	na

na—not available

[1] The 1990 Census urbanized area population was used as the MPO population in this calculation.

[2] Voting Index—Percentage representation of central city on MPO board divided by percentage of central city population in MPO.

Source: ACIR calculations based on U.S. Department of Transportation, Federal Highway Administration, 1993 Survey of MPOs.

CALIFORNIA MPO VOTING PROCEDURES

AGENCY	COUNTIES	CONTACT	ADDRESS	PHONE AND FAX	POP.	# OF CO.	# OF CITIES	VOTING MEMBERS
Association of Monterey Bay Area Govt's. (AMBAG)	Santa Cruz, Monterey	Mr. Nicolas Papadakis, Exec. Director	445 Reservation Road, Suite G (P.O. Box 838) Marina, CA 93833-0838	(408) 883-3750 FAX: 883-3755	609,800	2	16	20 members made up of 2 members of the Board of Supervisors from each coun and one member per city.
Butte County Association of Governments (BCAG)	Butte	Mr. Jon A. Clark, Executive Director	1849 Robinson Oroville, CA 95965	(916) 538-6866 FAX: 538-6868	201,000	1	5	10 members made up of th members of the Board of Supervisors and 1 city coun member from each city.
Council of Fresno County Governments	Fresno	Mr. William Briam, Exec. Director	2100 Tulare Street, Suite 619 Fresno, CA 93721	(209) 233-4148 FAX: 233-9645	735,800	1	15	16 members representing e city and the county.
Kern Council of Governments	Kern	Mr. Ronald E. Brummett, Executive Director	1401 19th Street, Suite 200 Bakersfield, CA 93301	(805) 861-2191 FAX: 324-8215	617,000	1	11	13 members made up of a member from each city and members of the County Boa Supervisors.
Merced County Association of Governements	Merced	Mr. Jesse Brown, Executive Director	1770 M Street Merced, CA 95340	(209) 723-3153 FAX: 723-3299	198,800	1	6	11 members made up of a member from each city and 5 members of the County B of Superviosrs.
Metropolitan Transportation Commission (MTC)	Alameda, Contra Coste, Marin, San Francisco, San Mateo, Santa Clara, Napa, Solano, Sonoma	Mr. Lawrence D. Dahms, Executive Director	Metro Center, 101 8th St. Oakland, CA 94607-4700	(510) 464-7700 FAX: 464-7848	6,391,900	9	100	19 members (16 voting and non-voting). The non-votin members represent State an Federal Govt. interests.
Sacramento Area Council of Governments (SACOG)	Sacramento, Placer, El Dorado, Sutter, Yolo, Yuba, Cities of Rocklin, Roseville, Lincoln, Loomis	Mr. Mike Hoffacker, Executive Director	3000 S Street, Suite 300 Sacramento, CA 95816	(916) 457-2264 FAX: 457-2284	1,489,175	4	15	11 members which broadly represent the cities and counties in the region.
San Diego Association of Governments (SANDAG)	San Diego	Mr. Kenneth E. Sulzer, Exec. Director	First Interstate Plaza, 401 B Street, Suite 800 San Diego, CA 92101	(619) 595-5300 FAX: 595-5305	2,688,000	1	18	19 members made up of an elected official from each cit and the county.

	VOTING INFORMATION
ty	One vote per member with a provision for weighted voting by population to be used in a tie vote.
5 cil	One vote per member, no weighted voting.
ich	All votes are weighted based on population. A vote can be blocked by members representing 40% of the population.
two rd of	One vote per member. Weighted voting is allowed when the MPO becomes the CMP agency and a dispute arises.
the oard	One vote per member. No provision for weighted voting.
3 d	2 votes each for San Francisco, Alameda, Contra Costa, San Mateo, Santa Clara and ABAG and SFBCDC. One vote each for other
	All votes are weighted based on 1 vote per county and 1 vote shared by all cities in the county with the exception of the City of Sacramento (2 votes) and the County of Sacramento (3 votes) for a total of 13 votes.
	One vote per member agency. Weighted voting can be called for by an agency. Weighted vote is determined by population with 100 votes distributed to 19 member agencies.

CALIFORNIA MPO VOTING PROCEDURES

AGENCY	COUNTIES	CONTACT	ADDRESS	PHONE AND FAX	POP.	# OF CO.	# OF CITIES	VOTING MEMBERS
San Joaquin County Council of Governments	San Joaquin	Mr. Barton R. Meays, Executive Director	102 S. San Joaquin St. 4th Floor (P.O. Box 1010) Stockton, CA 95202	(209) 468-3913 FAX 468-1084	521,500	1	7	13 members made up of tw members from the Board of Supervisors, 2 Stockton City Council members and a men from each of the other 6 citi
San Luis Obispo Council of Governments	San Luis Obispo	Mr.Ronald L. DeCarli, Executive Director	1007 Monterey Street San Luis Obispo, CA 93408	(805) 781-5714 FAX: 781-5703	231,300	1	7	12 members made up of the members of the County Boa Supervisors and one representative from each ci
Santa Barbara County Council of Governements	Santa Barbara	Mr. Gerald R. Lorden, Executive Director	222 East Anapama St. Suite 1 Santa Barbara, CA 93101	(805) 568-2547 FAX: 568-2947	391,600	1	7	12 members made up of on member from each city and members of the County Boa Supervisors.
Shasta County Regional Planning Agency	Shasta	Mr. Richard W. Curry, Exec. Secretary	1855 Placer Street Redding, CA 96001	(916) 225-5661 FAX: 225-5667	163,200	1	3	7 members-3 from the Cour Board of Supervisors, one fr each city, and one from the transit operator in the area.
Southern California Association of Governments (SCAG)	Imperial, Los Angeles, Orange, Riverside, San Bernadino, Ventura	Mr. Mark Pisano, Executive Director	818 West 7th Street, 122th Floor Los Angeles, CA 90017	(213) 236-1800 FAX: 1825	15,507,000	6	188	70 member Regional Council made up of 63 District Representatives and 7 Coun represenlaives (L.A. County 2 votes)
Stanislaus Area Association of Governments (SAAG)	Stanislaus	Mr. Greg Steel, Executive Director	1025 15th Street Modesto, CA 95354	(209) 558-7830 FAX: 558-7833	412,700	1	9	16 members, 5 members of Board of Supervisors, 3 Modesto City Council membe and 1 member from each remaining city.
Tulare County Association of Governments	Tulare	Mr. Douglas Wilson, Exec. Secretary	Transportation Planning Agency County Civic Center, Room 10 Visilia, CA 93291	(209) 733-6291 FAX 730-2621	350,600	1	8	16 members made up of one representative from each cit members of the Board of Superviosrs and 3 at-large members.

	VOTING INFORMATION
) ıber es.	One vote per member. Semi-weighted voting with Stockton getting an extra vote due to larger population.
5 rd of y.	One vote per member.
e 5 'd of	One vote per member with no provision for weighted voting.
ty ɔm	One vote per member with no provision for weighted voting.
ty has	One vote each district member and county representative (L.A. Co. has two votes). District are made up of geographical areas of 200,000 population.
the 'rs,	One vote per member.
/, 5	The 3 at-large members are appointed by the other board members and are, preferably, from the unicorportated area of the County. No weighted voting.

ADDITIONS TO THE RECORD

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INSTITUTE OF TRANSPORTATION ENGINEERS

July 25, 1994

Honorable Robert A. Borski
Chairman
Investigations and Oversight Committee
House Public Works and Transportation Committee
585-89 Ford House Office Building
Washington, DC 20515

Dear Chairman Borski:

The Institute is pleased to provide written comments to supplement your July 1994 hearings on the implementation of intelligent vehicle highway systems (IVHS) programs by state and local agencies.

First, the Institute would like to commend the U.S. Department of Transportation for its effective leadership, administration and delivery of the federal IVHS program. This program has increased from a $4 million annual program to a $200 million a year program in just a few short years. The U.S. DOT has managed this growth in an effective and efficient manner, delivering a program of IVHS research and operations tests that is laying the foundation for long term transportation improvements.

Regarding the delivery of IVHS programs to state and local agencies, these agencies are finding it difficult for IVHS to compete for limited resources with more politically visible highway reconstruction projects. The Institute therefore wishes to stress the importance of providing for long term IVHS deployment, operations and maintenance, particularly for Advanced Transportation Management Systems (ATMS).

In recent studies done by the Institute for the U.S. Federal Highway Administration, state and local agencies report that there is currently a 20-25 percent shortfall in funding and personnel needed to effectively operate and maintain traffic control systems that are in place today. The multifold increase in the number and extent of these systems needed in the coming years will only exacerbate this situation unless corrective action is taken. Additional information is attached. Information is also available in the March 1994 GAO report "Transportation Infrastructure—Benefits of Traffic Control Signal Systems Are Not Being Fully Realized."

Chairman Borski
page 2

For IVHS to be successful, there will have to be a commitment in the project planning stages to provide for adequate funding and staff resources to deploy, operate and maintain these systems. The conventional practice of waiting to address operation and maintenance considerations until after the project is implemented will not suffice for IVHS. We must break away from the traditional definition of a "highway project"—a definition that includes planning, design, and implementation—but then stops before operation and maintenance. Traffic management systems are not the same as laying pavement. Just as modern economic analysis is based on full "life-cycle costing", the ongoing operational nature of ATMS projects means that they need "life-cycle funding" to provide for a seamless transition between deployment and operations and maintenance.

The continuous daily exposure of IVHS to transportation users, combined with the critical nature of IVHS application locations, makes IVHS very visible to the public. Experience has already demonstrated that any failures of IVHS due to operational and/or maintenance problems will be immediately apparent to the user. If operational/maintenance considerations are not supported to the same degree as the development of IVHS technology, public support for IVHS could evaporate quickly.

The Institute therefore requests that consideration be given to allowing state and local governments, at their discretion, to use a portion of their federal-aid allocation for funding the operations and maintenance elements of IVHS projects.

Thank you for your consideration of these comments. If you have any questions or would like additional information, please do not hesitate to contact this office.

Sincerely,

Thomas W. Brahms
Executive Director

Institute of Transportation Engineers
Urban Traffic Engineering Issues and Answers
DATA COLLECTION SUMMARY
IVHS ISSUES

The Institute is an individual membership educational and scientific international association of more than 12,000 transportation engineers and planners. ITE members are responsible for the safe and efficient movement of people and goods on streets, highways, and transit systems. They are engaged in planning, designing, operating, managing, and maintaining surface transportation systems in 70 countries. Institute programs and resources include professional development seminars, technical reports, a monthly journal, local, regional, and international meetings, and other forums for the exchange of opinion, ideas, techniques, and research. The Institute has long been among the leaders in applying advanced technologies to surface transportation systems.

The following is a summary of the information collected by ITE on IVHS as part of a project for the Federal Highway Administration. Mail surveys, focus groups, and telephone follow-ups were used to collect information on a variety of issues from state and local agencies.

Survey Responses
- 125 local responses, cities, counties and towns. 22 states.
- Cities population less than 50,000=22; 50,000-100,000=28; 100,000-250,000=41; 250,000-500,000=14 ; 500,000-1 million=8; greater than 1 million=7

State Freeway ATMS Status and Outlook
- Although 40% of responding states are not currently involved with ATMS, the responses indicate that most if not all the states plan aggressive ATMS programs for future years.
- Reporting states expect a more than doubling of the number and extent of freeway control systems over the next 5 years.
- 8 states provided data on 15 freeway systems totaling just under 1,000 miles of freeways. Most systems covered less than 50 miles.
- Two-thirds of these state freeway ATMS systems were installed prior to 1990, before the terms IVHS or ATMS came into vogue. Most of these systems are currently undergoing upgrades or expansions.
- A 300-400% increase in the number of major freeway ATMS elements (variable message signs, cameras, detectors, etc.) is expected over the next 5 years.
- These responses indicate that most states are now on the cusp of implementing or significantly expanding freeway ATMS.
- To date, most traffic control centers have been set up to manage one system. It was pointed out that in the future control centers will more likely manage multiple systems within an urban area or even throughout an entire state.

Status and Outlook for Local Systems
- More than half of local agencies (55%) feel IVHS will have little or no impact or they don't know, including 62% of those agencies with populations under 100,000, and 50% of those over 100,000. However, this drops to 20% of agencies over 500,000 population.
- Urban agencies expect the number of traffic signals to increase by 10% over the next 5 years. The number and percent of signals that are part of coordinated systems is expected to increase even faster. This number is expected to increase by 28% over current levels over 5 years, raising the percent of signals that are included in these systems from 59% today to 69% in 1998.
- While approximately 1 in 4 urban agencies report ATMS systems (other than signal systems) currently existing in their urban areas, 1 in 2 expect to have one or more of these systems in

place over the next 5 years, including 1 in 3 expecting to have incident management systems and 1 in 4 freeway control system. Less than half of the local agencies expect these ATMS systems to be integrated with the urban signal system. About twice the number of agencies expect to be involved with incident management systems than for any of the other systems.
- More than half of urban agencies report little or no increases in funds available for traffic improvement projects as a result of ISTEA, with some even reporting a decrease. However, almost 2/3 of states reported increased ATMS activities as a result of ISTEA.
- Many agencies are finding it hard to compete for funds with highway rehabilitation projects. Agencies are therefore trying to incorporate some ATMS elements within these projects.

Operations and Maintenance Outlook
- 44% of urban agencies rate their ability to operate and maintain existing signal systems today as fair or poor.
- Half the states rate their current ability to operate existing ATMS as fair or poor, and two-thirds rate as fair or poor their ability to maintain these systems.
- States varied widely in the percentage of freeway ATMS operations and maintenance functions being accomplished by outside contract now and expected in 5 years (0 to 100%). No change in operations functions was forecast by these states, but the percent of maintenance functions accomplished through outside contractor is predicted to more than double over the next five years.
- State and local agencies report that 22% more funding is needed to effectively operate and maintain existing systems, and 20% more personnel.
- Inadequate funding for continuing operations and maintenance is considered the top problem by urban traffic engineering agencies of seven choices listed. Shortages of qualified personnel is expected to increase in importance over the next 5 years, to rank equal with operations and maintenance funding shortfalls. Shortage of capital funding is next. Others trail behind.
- 4 of 5 urban agencies site lack of funding for capital and operations and the inability to keep detectors operating as problems they face, with about 30% of these agencies rating these as major or severe problems.
- Of the options presented to help in the operation and maintenance of signal systems and ATMS, the establishment of minimum standards was felt to be the most important by both urban agencies and states. Almost half or urban jurisdictions and more than half of states rated this as essential.

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Statement for the

Investigations and Oversight Subcommittee

of the

House Public Works and Transportation Committee

Hearing on

Intelligent Vehicle-Highway Systems

July 21, 1994

Enhancing Deployment of IVHS Products and Services in the U.S.

Jerry Werner
President
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Austin, TX

Abstract: The current national IVHS effort overly concentrates on "technology push" and fails to develop the necessary "technology pull" by state and local transportation agencies. This imbalance will retard deployment of IVHS in the U.S. The U.S. Department of Transportation must develop new paradigms for sharing "ownership" of IVHS with those state and local agencies and Metropolitan Planning Organizations that make deployment decisions. Several recommendations for enhancing this shared ownership are provided.

Enhancing Deployment of IVHS Products and Services in the U.S.

My name is Jerry Werner, and I am the founder and President of Werner Associates, a consulting firm specializing in strategic planning, technology partnerships, and technology transfer for advanced information technologies. Our involvement with IVHS began in October, 1991, when I was invited by Dr. James Costantino, IVHS AMERICA's Executive Director, to address IVHS AMERICA's Coordinating Council on the "Challenges of New Technology Adoption." Since then, we have consulted for both IVHS AMERICA and the IVHS Institute of the University of Minnesota. Werner Associates is a corporate member of IVHS AMERICA.

In the IVHS field, I personally invest a significant amount of my time in gaining a better understanding of the needs and perspectives of those state and local transportation agencies and individuals who build and operate the national "transportation infrastructure." I regularly attend traffic management team (TMT) and mobility meetings in various Texas cities. I moderated brainstorming sessions in two different groups within Mn/DOT (the Traffic Management Center and Guidestar) to identify key user issues, challenges, and problems. I served as co-moderator of an early workshop to identify key user issues regarding a national IVHS system architecture. Werner Associates' three Senior Associates each have over 30 years of public-sector transportation experience.

While I am an electrical engineer by education and experience, my recent background is in technology collaborations and technology transfer. From 1984 to 1990, I was Director of Technology Transfer for one of the large software programs within the Microelectronics and Computer Technology Corporation (MCC), one of our nation's first and largest cooperative technology initiatives. In this role, I gained a first-hand understanding of challenges and solutions for encouraging users to adopt innovative information and computer technologies. I have written numerous articles and editorials on technology collaboration and technology transfer/adoption (including articles in *Issues in Science & Technology* and *Research-Technology Management* magazines), and am extensively quoted in the new book *R&D Collaboration on Trial* (Harvard Business School Press). During this summer (1994), I am teaching a graduate course on technology transfer at the University of Texas in Austin.

In many years of working with innovators and technology users, I've come to gain a first-hand understanding of the overall process of technology adoption, and particularly the importance of two key elements, *technology push* and *technology pull*. Technology push involves the aggressive marketing and promotion of new "solutions" to potential funders and/or users of these new solutions. Conversely, technology pull describes the situation in which potential adopters strongly desire new solutions and "pull" them from technology sources. For the successful adoption (or "deployment" as commonly used in the IVHS field) of new technologies to occur, both elements (push and pull) must exist in a balance. The ideal way to create this balance is for solution-providers and problem-owners to work cooperatively on the development of new solutions, with the solution-providers responsible for bringing technology advances to help address the most important issues facing the problem-owners. This approach fosters the "buy-in" of the solutions by the potential community of users.

The private sector has been rapidly catching on to the need for a balance between solution-providers and problem-owners in the development of new high-tech systems.

Enhancing Deployment of IVHS Products and Services in the U.S.

Increasingly popular *concurrent engineering* and *joint application development* (JAD) strategies both help optimize this balance. Recently, Boeing successfully used a related approach in the design of its new 777 aircraft, by inviting its customers (major commercial airlines) to join the design team for the aircraft. Their thinking was both innovative and logical: partnering with its customers in the design of the 777 would achieve three major purposes:

1. It would ensure that the customers' needs were reflected as the plane was designed, not after the fact.
2. It would improve customers' acceptance of the new aircraft (via "buy-in").
3. It would thus accelerate the sales of the new aircraft.

Unfortunately, the current national IVHS effort does not achieve a balance between technology push and technology pull crucial to rapid adoption/deployment of new IVHS products, and the realization of significant national benefits. The primary problem is that the ultimate "customers" for IVHS products in state and local agencies are not full partners in the national IVHS effort. The April 6, 1994 Automated Highway System (AHS) workshop sponsored by the U.S. DOT is a case in point. Of the approximately 200 registered attendees of the workshop, fewer than 10% were from state highway organizations -- those who would be primary "pullers" of advanced technology. By far the bulk of the attendees represented technology suppliers and defense contractors eager to sell their existing technologies into new transportation markets.

Associates who have worked in the transportation field for many years tell me that the U.S. DOT, and particularly the Federal Highway Administration, is more open than ever before to the inputs of potential users in state and local agencies. This new attitude is a step in the right direction. However, it must be continuously supported and encouraged by the U.S. DOT and the U.S. Congress. I'd like to share my ideas and recommendations for accelerating the adoption of IVHS technologies by public-sector agencies.

The U.S. Deployment Problem

Numerous U.S. policymakers are increasingly concerned about lagging national deployment of IVHS technologies in this country, especially when compared against the deployment situation in Japan. The U.S. shortfall is well documented in the recent report commissioned by IVHS AMERICA, entitled *A Comparison of IVHS Progress in the United States, Japan & Europe Through 1993.*

A key element of this deployment problem is that the national "IVHS infrastructure" does not exist that will support the widespread and cost-effective use of IVHS technologies. For example, an automobile equipped with a traveler information system designed for either the Travtek (Orlando), Advance (Chicago), and FAST-TRAC (Oakland County, MI) national IVHS operational tests will not function in either of the other two test regions, because of incompatible standards and system designs. This lack of standardization makes current IVHS systems extremely expensive, because system design costs must be fully borne for each installation. Worse, the lack of communications standards between vehicles and the transportation infrastructure mean that vehicle manufacturers, which constantly seek a large, potentially

high-volume market, are reticent to pay much attention to the current IVHS market. In the current environment, everybody loses.

State and local governments and transportation departments, and metropolitan planning organizations (MPOs) are key to successful national deployment of IVHS. They are ultimately responsible for planning, selecting, installing, operating, and maintaining many of the most important IVHS technologies, including the national "framework" upon which many of the most appealing new IVHS products (such as in-vehicle traffic guidance systems) will depend. If this standard framework does not exist across the U.S., IVHS solutions will continue to be custom and costly, and the potential private-sector market for IVHS products will not fully materialize.

Widespread deployment of IVHS in this country will only happen if state/local agencies share ownership in the national movement with the U.S. DOT. Without this shared ownership, progress toward establishing a public-sector underpinning for these new IVHS technologies will be painfully slow. Shared ownership does not mean that the federal government or its contractors can simply survey state/local users to determine their needs. Such a passive relationship will not lead to a true partnership. Instead, the U.S. DOT must empower state/local "infrastructure users" as full partners with the federal government during every step of the process: problem/need identification, collaboration with technology developers, operational testing, and deployment.

This empowerment is very difficult to accomplish, in part due to ingrained policies and practices within the federal, state, and local sectors. These ingrained ideas often work against the adoption of advanced technology by state and local users. A "customer-supplier" relationship often exists between the federal government (FHWA and FTA) and state transportation agencies. In this relationship, the state agencies (suppliers) are unlikely to challenge the federal agency (customer), for to do so could jeopardize future federal funds. However, in an effective partnership such challenging must be encouraged, not penalized. This customer-supplier relationship is particularly a problem in the current national IVHS system architecture effort, because state and local transportation departments must be full partners, not subordinates, with the federal government in this effort. If this partnership is not established, the degree of "technology pull" for the national IVHS architecture will be limited to the amount of federal funds available to state and local agencies. Unless the federal government plans to fully fund the deployment of this national architecture, shared ownership will be absolutely essential.

Recommendations for Enhancing Deployment

1. Refocus the national dialog on problems rather than solutions. Much of the national discussion about IVHS has historically centered around technologies (solutions), such as Advanced Vehicle Control Systems (AVCS) and Advanced Traffic Management Systems (ATMS). Potential user-adopters will be interested in these technologies only to the extent that they address specific problems and challenges. To enhance deployment, the dialog needs to be centered on how well these technologies address real-world challenges and help alleviate existing transportation problems. The FHWA has recognized that the IVHS dialog was overly technology-oriented, and has centered the current draft of the National IVHS Program Plan on a set of "user services." This is a step in the right direction, but doesn't go far enough. The current

version of the national program plan focuses attention on solutions (user services), rather than problems. By subdividing potential IVHS benefits into a large number (28) of separate user services, the Plan tends to make the national effort seem much more complicated that it needs to be. For example, many of the user services that will reduce travel volume and congestion could also improve air quality, by reducing the overall number of vehicles (or at least vehicles that are caught in traffic). By considering these user services separately, the Plan misses the opportunity to encourage collaboration by those who want improved mobility and those working to improve air quality.

2. The Federal Government (particularly the FHWA) must share ownership/responsibility/control with state and local governments. Currently, the U.S. DOT (and primarily the FHWA) fully controls the national IVHS effort, even though decisions to deploy IVHS products will largely be made at the state and local level. Metropolitan Planning Organizations (MPOs) and state transportation departments have very little direct ownership in the national IVHS effort, in part because of the "customer-supplier" relationship that has traditionally existed with the federal government. While the U.S. DOT has the responsibility to ensure an interoperable national transportation system, it must share ownership in this system with regional/state/local entities. It could do so in the following ways:

- *Delegating control for addressing specific problem areas to organizations with a grass-roots membership.* Three organizations come to mind: AASHTO (representing state transportation officials), the Institute for Transportation Engineers (representing both state and local people), and the National Association of Regional Councils (representing MPOs from around the country). Each organization could be assigned part ownership in the national effort, including both the responsibility to spearhead a grass-roots dialog on common national transportation-related problems, and control over federal funding (within broad federal guidelines) to help alleviate these problems with IVHS solutions.
- *Empowering state and local transportation operations people.* The Transportation Research Board has many active committees of transportation practitioners, including the Freeway Operations Committee (comprised of leading state transportation operations people) and the Signal Systems Committee (comprised of both state/local transportation people). The U.S. DOT could empower these committees to serve a more formal role in defining IVHS needs, for example as official committees of IVHS AMERICA's Coordinating Council. By increasing the clout of the IVHS user community in IVHS AMERICA, a greater balance would be developed between IVHS push and pull elements.

3. National IVHS operational tests must change from demonstration projects to objective evaluations. The early IVHS operational tests, such as the Travtek project in Orlando, Florida, were primarily designed to showcase the potential of advanced technology. These demonstration projects were designed to promote IVHS and to "open the minds" of individuals who might not have been exposed to such new technologies. The rapid growth in awareness about IVHS (in large part due to the effectiveness of IVHS AMERICA in this area) and increasing need to foster deployment has reduced the need for such demonstration projects. Future operational tests must be designed to provide objective and credible information to state/local decisionmakers about the true benefits of IVHS deployment. One way to ensure this credibility is to involve more operations people (such as the TRB Freeway Operations Committee, mentioned previously) and

planning people (from MPOs) in setting operational test objectives. In addition, future IVHS operational tests should encourage multiple state/local agencies to cooperate, rather than to individually compete for federal funding (as is currently the case).

4. **Federal funds should be allocated to encourage "grass-roots" interaction.** It is absolutely essential for state and local transportation people around the country to jointly "brainstorm" their common needs and objectives, and to share "lessons learned" concerning IVHS technologies and products. Many state transportation departments (Caltrans, for example) restrict interstate travel by their employees. While information exchange is encouraged within the framework of IVHS operational tests, this interaction is charged against total project funds, effectively penalizing team members from sharing their findings with those in other states or regions. Congress should establish a separate fund for travel by state/local transportation people to functions that support the grass-roots IVHS consensus-building effort. In addition, Congress and/or the U.S. DOT should encourage and financially support the development and use of nationwide teleconferencing facilities to encourage frequent interaction by state/local transportation people in the consensus-building process. Finally, IVHS AMERICA currently has a financial disincentive to actively and aggressively support regional IVHS organizations, such as IVHS Texas in my home state, because the more support it provides the more money it loses. Congress should provide a net incentive for IVHS AMERICA to support such grass-roots activity.

5. **State and local agencies must become full-participants in the national IVHS systems architecture effort.** Currently, the national IVHS architecture is spearheaded by four architecture teams, each headed by a large defense/systems company. Understandably, each defense company wants to develop a new domestic market for its existing high-tech products and expertise -- hence a strong "technology push" orientation of this architecture effort. While each team includes state transportation departments, these team members are in a subordinate role and include few transportation operations people. The process must be changed to ensure that a broad array of state and local "infrastructure people" are invited to be full partners in the IVHS systems architecture design effort, much as airline companies joined the design team for the Boeing 777. It also must be modified to encourage collaboration by state/local transportation agencies, rather than competition, as is currently the case in Phase I of the national IVHS systems architecture effort.

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